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Emotions in Consumer Research
An Application to Novel Food Products

Emotions in Consumer Research An Application to Novel Food Products

Proefschrift

ter verkrijging van de graad van doctor aan de Universiteit van Tilburg, op gezag van de rector magnificus, prof.dr. F.A. van der Duyn Schouten, in het openbaar te verdedigen ten overstaan van een door het college voor promoties aangewezen commissie in de aula van de Universiteit op vrijdag 24 maart 2006 om 14.15 uur door

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“Everything that has a beginning has an end”¹

When writing a Ph.D. it is often difficult to imagine that there will actually be a moment that the dissertation is “finished” and printed. When writing a Ph.D. one also experiences a lot of emotions, and I think that during my four years I experienced every one of the emotions that I describe in my dissertation. I felt abundant negative emotions: anger (e.g., when the results were not what I expected), fear (e.g., when I was wondering if I would ever finish in time), sadness (e.g., again struggling with the analyses), shame (a Ph.D. is a learning process after all), but also positive emotions: contentment (e.g., after presenting successfully at conferences), happiness (e.g., when the results were as expected), and pride (e.g., for publishing my papers). And now that I reached the end – ready to start a new beginning – I am extremely happy, proud, and most of all relieved that I accomplished my Ph.D. in Marketing! Even though writing a Ph.D. is an individual accomplishment, I did not have to do it on my own. The following people all contributed to this dissertation, each in their own way, and I would like to express my gratitude to them.

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¹ Matrix Revolutions, 2003

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CHAPTER 1

INTRODUCTION

1.1 NOVEL FOOD PRODUCTS AND EMOTIONS

“I don’t know what is in them and how they are made. That is why I don’t like them.”

That was the reaction of a consumer (female, 54 years of age) when confronted with the latest inventions of the biotechnology industry: genetically modified food, genetically modified crops, and food products that can reduce illness. There seem to be no end to the stream of technologies that can be used to improve food production and food products. The general public, however, does not always react in the way that the biotechnology and food companies expect and hope. For instance, the majority of consumers reject genetically modified food products completely (e.g., Bredahl et al., 1998). In an era where consumers are increasingly interested in their health (AC Nielsen, 2004), they are concerned about how their food is produced or processed, and where it comes from. Accordingly, they take these factors into account when evaluating a food product.

Emotions are responses to the events that are important to the individual (Frijda, 1988). Thus, when consumers are interested in, or even concerned about the production of food products, their emotions with respect to a particular food product will be sparked. Moreover, these emotions are amplified by the fact that food involves an intimate exchange between the environment and the self, whereas these two entities are normally quite separate (Rozin, 1999). Although consumers are in favor of the new inventions for telecommunications and the internet, that is not the case when it comes to biotechnology (Eurobarometer, 2003). When it comes to swallowing novel food products – food is the only consumption good that actually enters the body – consumers are less accepting of new technologies. And even though all food products available on the supermarket shelves should be safe, it is not the objective nature of the food product but the evaluation of the consumer that determines the emotion associated with it (Scherer, 1999). If a consumer finds a food product risky, he (or

she) will experience negative emotions, regardless of whether the product is in fact safe or not.

Furthermore, previous research has established a strong relationship between novel technological products and emotions (Bagozzi and Lee, 1999; Mick and Fournier, 1998). Novel products that involve a highly advanced technology cause negative emotions (Veryzer, 1998) and often result in product failures (Goldenberg et al., 2001). Consumers favor “secure progress” (Goldenberg et al., 2001). In other words, innovative products are nice, as long as the way to produce them has not changed drastically. This explains why the public rejects new methods (of food production) like gene technology and other advanced technologies (Grunert, 2002). The emotions of consumers with respect to technologically novel food products thus have important consequences.

To summarize, technologically novel food products elicit emotions for several reasons. First, technological novelty by itself causes emotions. Second, these emotions are intensified due to the increased interest of consumers in the production and processing background of food products. Third, because it concerns food, which plays a central role in life as a source of nutrition and has to enter the body (Rozin, 1999), the emotions of consumers become even stronger. Moreover, these emotions have an important influence on behavior.

1.2 OBJECTIVES OF THIS DISSERTATION

The central objective of this dissertation is therefore to shed light on the emotions of consumers with respect to novel food products that require a new and advanced technology for their production¹. A new flavor of yogurt therefore is not considered a novel food product, but yogurt that lowers the consumers’ cholesterol levels or is produced with genetically modified enzymes is. In this dissertation I will go beyond the cognitive risk-benefit evaluation of these novel food products and propose that emotions play a crucial role in the responses of consumers to novel food products.

¹ From now on I will use the term **novel food products** to refer to these products.

The contribution of this dissertation lies in the combination of a “hot” topic in consumer research, viz. consumer emotions, and a “hot” topic in our society, viz. novel food products. The growing field of consumer emotions research is a very broad area with more differences than commonalities. Yet all the studies have one thing in common: they show the essential role of emotions in consumer behavior. In our complex world, where consumers are burdened with information, it is a lot easier to rely on one’s feelings than to construct a careful evaluation using the pros and cons of the product. This dissertation aims to contribute to this growing literature in several ways. Firstly, I will create a framework for consumer emotions that distinguishes emotions based on their level of abstractness. I will discuss the differences between intensities of emotions across novel food products, and that fear in particular can be linked to genetically modified food. Secondly, I will focus on the interaction between a consumer’s emotions and cognitive beliefs. To show their relative importance, emotions are positioned next to risks and benefits in their impact on purchase intention. In addition, I will extend the value-evaluation-behavior models by including the emotions of consumers. These emotions mediate the relation between the evaluations and purchase intention of a novel food product by a consumer.

Furthermore, this dissertation can be seen as an approach towards a better understanding of the feelings of the society towards new technologies with respect to production and processing of food products. It is rather difficult to convince consumers to accept these products. It is therefore crucial for both managers and public policy makers to know where consumers’ emotions come from and what their consequences are, and – more importantly – how to deal with them.

1.3 OVERVIEW OF THIS DISSERTATION

Chapter 2 to 5 document the empirical studies conducted to clarify the role of emotions in consumer behavior with respect to novel food products. Table 1.1 presents an overview of the positioning of these chapters including their purpose, the emotions included, the specific type of food that has been used to test the model, the number of respondents that filled out the questionnaire, and the key findings. Chapter 6 summarizes the whole dissertation by giving an overview of the outcomes of the empirical chapters. It addresses the contributions to the consumer behavior literature

and the implications for managers and public policy makers. In addition future research suggestions are discussed.

The purpose of this dissertation is to create a wider understanding of what causes consumer emotions and what consequences those emotions have. Chapter 2 lays the groundwork by discussing the structure and content of consumer emotions. I give an overview of the application of emotions in consumer behavior research, and unite seemingly diverging research streams into one framework. In chapters 3, 4, and 5 consumer emotions associated with novel food products are embedded in frameworks including their antecedents and consequences. Moreover, chapter 4 compares the importance of emotions vs. cognitions, and chapter 5 investigates the value-evaluation-emotion-behavior framework. In addition, I include a relevant moderator in chapter 4 (perceived knowledge) and chapter 5 (age) to show the differences in experiences of emotions between consumers.

The hierarchical consumer emotions model in chapter 2 shows that consumer emotions can be assigned to three different levels of abstractness. Due to the specific fear appeals in the media regarding genetically modified foods the focus in chapter 3 is on the basic emotion fear. In chapters 4 and 5 the purpose of the study is to explore the role of emotions next to beliefs and to show their place in the value-evaluation-emotion-behavior framework, respectively. Hence, the increased informative content acquired with using a basic emotion was not necessary. As a result, chapters 4 and 5 use negative and positive affect as emotional measures.

Four different food products are examined in this dissertation. These are genetically modified food, functional food, organic food and regular food. The first two are novel food products, and the latter two are included for comparison purposes. Genetically modified food is food produced using gene technology. Functional food is food that has been modified or enriched with naturally occurring substances (for example, vitamins), which have a specific physiological advantage that prevents disease or promotes health (Bech-Larsen et al., 2001). Organic food is produced according to the “natural” growing processes, i.e. where the use of synthetic fertilizers and chemical pesticides is avoided or largely excluded (Schifferstein and Oude Ophuis, 1998). Regular food is the “normal” food you buy in the supermarket. To test the hierarchical consumer emotions model, chapter 2 includes all four different food products. Chapter 3 uses the four different food products to validate the fear scale, but focuses solely on genetically modified food for the framework with antecedents and

Table 1.1. Overview of empirical chapters

	Chapter 2	Chapter 3	Chapter 4	Chapter 5
Purpose	<ul style="list-style-type: none"> Literature review on emotions in consumer behavior Converge consumer emotion research streams 	<ol style="list-style-type: none"> Scale validation of the emotion fear Antecedents and consequences of fear of genetically modified food 	Moderating effect of perceived knowledge on impact of emotions vs. cognitions on consumers' responses to radical innovations	Moderating impact of age on proposed framework: Food-related lifestyle values → functional food product evaluations → emotions → purchase intention
Consumer emotions	Full set of consumer emotions	Fear	Negative and positive affect	Negative and positive affect
Food application	Genetically modified food, functional food, organic food, regular food	<ol style="list-style-type: none"> Genetically modified food, functional food, organic food, regular food Genetically modified food 	Genetically modified food	Functional food
# Respondents	645 Dutch consumers	<ol style="list-style-type: none"> 645 Dutch consumers 164 Dutch consumers 	443 Dutch consumers	793 Dutch consumers
Key findings	<ul style="list-style-type: none"> Hierarchical consumer emotions model with three abstraction levels Basic emotions contain more information than negative and positive affect 	<ol style="list-style-type: none"> Fear is strongly related to genetically modified food Fear influences the attitude toward genetically modified food 	Negative and positive affect impact consumer responses for all consumers, whereas net cognition impacts especially those with high perceived knowledge	Age causes important differences in the proposed framework, although negative and positive affect have an important impact on the purchase intention for consumers of all ages

consequences of fear. Chapters 4 and 5 concentrate exclusively on genetically modified food and functional food, respectively².

To increase generalizability all studies use large samples of representative Dutch consumers (varying between 443 and 793 respondents) and rigorous research methods.

The key finding of chapter 2 is that seemingly diverging research streams can be integrated in a hierarchical consumer emotions model. The superordinate level consists of the frequently encountered general dimensions positive and negative affect. The subordinate level consists of specific emotions, based on Richins' (1997) Consumer Emotions Set. As an intermediate level four negative and four positive basic emotions are proposed. Tests of this second-order model suggest that basic emotions provide more information about the feelings of the consumer, over and above positive and negative affect.

In chapter 3, I go on to show that Dutch consumers indeed feel significantly more fearful of genetically modified foods than of other new food types. There are no strong linkages between consumers' socio-demographic make-up and fear of genetically modified food. This indicates that fear of this technologically new type of food is an emotion that cuts across the whole society. A conceptual model of key antecedents and consequences of fear of genetically modified food shows that fear of genetically modified food is positively influenced by consumers' concern for the environment and negatively affected by their faith in technology. Consumers who are more fearful of genetically modified food have a more negative attitude toward genetically modified food in general and toward genetic modification of animals, and exhibit a greater interest in information related to food production and genetic modification. The results of this chapter underline the importance of studying fear emotions in the context of genetically modified food.

The results of chapter 4 indicate that, in general, consumers with a low perception of knowledge rely indeed less on their beliefs to construct their responses than consumers with a high perception of knowledge. The latter rely both on their

² In chapter 2, 3, and 4 we measured genetically modified food with a general term in the questionnaire, because previous research indicates that consumers reject this technology as a whole (Bredahl, 2001). For the study on functional food in chapter 5, however, we used specific products for the measurement of functional food in the questionnaire, because the acceptance of functional food products is very much dependent on the fit between the food product and its functional benefit (Van Kleef et al., 2003).

beliefs and their emotions. This chapter underlines the importance of emotions in the response of consumers, especially for those who perceive to know less of the radical technology.

The empirical results of chapter 5 show that the values *health* and *convenience* as well as the product evaluations *relative advantage* and *confidence in the benefit* play an important role in the construction of consumers' emotions and purchase intention for functional food products. There are significant differences among the consumers of different age groups in factors that drive their emotions and purchase intentions. Yet the relationship between the emotions and purchase intention is equally strong across all age groups.

Overall, these studies reveal the central role of emotions in the responses of consumers to novel food products.

CHAPTER 2

EMOTIONS IN CONSUMER BEHAVIOR: A HIERARCHICAL APPROACH¹

2.1 INTRODUCTION

After a long period in which consumers were assumed to make largely rational decisions based on utilitarian product attributes and benefits, in the last two decades, marketing scholars have started to study emotions evoked by marketing stimuli, products and brands (Holbrook and Hirschman, 1982). Many studies involving consumer emotions have focused on consumers' emotional responses to advertising (e.g., Derbaix, 1995), and the mediating role of emotions on the satisfaction of consumers (e.g., Phillips and Baumgartner, 2002). Emotions have been shown to play an important role in other contexts such as complaining (Stephens and Gwinner, 1998), service failures (Zeelenberg and Pieters, 1999) and product attitudes (Dubé et al., 2003). Emotions are often conceptualized as *general* dimensions, like positive and negative affect, but there has also been an interest in more *specific* emotions. Within the latter stream of research some researchers use a comprehensive set of specific emotions (Richins, 1997; Ruth et al., 2002). Other researchers concentrate on one or several specific emotions such as surprise (e.g., Derbaix and Vanhamme, 2003), regret (e.g., Inman and Zeelenberg, 2002; Tsiros and Mittal, 2000), sympathy and empathy (Edson Escalas and Stern, 2003), embarrassment (Verbeke and Bagozzi, 2003) and anger (Bougie et al., 2003; Taylor, 1994).

Despite this emerging body of research, progress on the use of emotions in consumer behavior has been hampered by ambiguity about two interrelated issues, viz. the structure and content of emotions (Bagozzi et al., 1999). First, with regard to structure, some researchers examine all emotions at the same level of generality (e.g., Izard, 1977), whereas others specify a hierarchical structure in which specific emotions are particular instances of more general underlying basic emotions (Shaver

¹ This chapter is based on Laros, Fleur J.M., and Jan-Benedict E.M. Steenkamp (2005), "Emotions in Consumer Research: A Hierarchical Approach," *Journal of Business Research*, 58 (10), 1437-1445

et al., 1987; Storm and Storm, 1987). Second, and relatedly, there is debate concerning the content of emotions. Should emotions be most fruitfully conceived as very broad general factors such as pleasure/arousal (Russell, 1980) or positive/negative affect (Watson and Tellegen, 1985)? Alternatively appraisal theorists (see e.g., Frijda et al., 1989; Roseman et al., 1996; Smith and Lazarus, 1993) argue that specific emotions should not be combined in broad emotional factors, because each emotion has a distinct set of appraisals. The confusion concerning structure and content of emotions has hindered the full interpretation and use of emotions in consumer behavior theory and empirical research (Bagozzi et al., 1999).

The purpose of our paper is twofold. First, we integrate seemingly opposing research streams in psychology and consumer behavior by developing a hierarchical model of consumer emotions. We will show that the general dimensions with positive and negative affect are the superordinate and most abstract level at which emotions can be defined. The subordinate level consists of specific consumer emotions. We will develop an intermediate level with basic emotions that links these two levels. Second, we conduct a preliminary test of this proposed structure and compare the means for positive and negative affect with those of the basic emotions for four different food types.

2.2 EMOTIONS IN CONSUMER RESEARCH

This section will briefly discuss an illustrative set of consumer studies on emotions (see table 2.1 for an overview).

Several studies focused on the emotional responses to ads. Holbrook and Batra (1987) developed their own emotional scale based on an in-depth review of the literature. They uncovered a pleasure, arousal and domination dimension in their data, and showed that these emotions mediate consumer responses to advertising. Edell and Burke (1987) also created their own emotion list and found that feelings play an important role in the prediction of the ad's effectiveness. They proposed three factors: an upbeat, negative, and warmth factor. Olney et al. (1991) showed that the emotional dimensions pleasure and arousal mediate the relation between ad content and attitudinal components, and consequently viewing time of an ad. They used part of Mehrabian and Russell's scale (1974). Derbaix (1995) replicated the research of Edell

Table 2.1. Overview of consumer research using emotions as a main variable

Reference	Emotion measure used	Resulting structure
Edell and Burke (1987)	Edell and Burke (1987)	Upbeat, negative and warm
Holbrook and Batra (1987)	Holbrook and Batra (1987)	Pleasure, arousal and domination
Westbrook (1987)	Izard (1977)	Positive and negative affect
Olney et al. (1991)	Mehrabian and Russell (1974)	Pleasure and arousal
Holbrook and Gardner (1993)	Russell et al. (1989)	Pleasure and arousal
Mano and Oliver (1993)	Watson et al. (1988)/Mano (1991)	Upbeat, negative and warm Positive and negative
Oliver (1993)	Izard (1977)	Positive and negative affect
Derbaix (1995)	Derbaix (1995)	Positive and negative affect
Steenkamp et al. (1996)	Mehrabian and Russell (1974)	Arousal
Nyer (1997)	Shaver et al. (1987)	Anger, joy/satisfaction, sadness
Richins (1997)	Richins (1997)	Anger, discontent, worry, sadness, fear, shame, envy, loneliness, romantic love, love, peacefulness, contentment, optimism, joy, excitement, surprise
Dubé and Morgan (1998)	Watson et al. (1988)	Positive and negative affect
Phillips and Baumgartner (2002)	Edell and Burke (1987)	Positive and negative affect
Ruth et al. (2002)	Shaver et al. (1987)	Love, happiness, pride, gratitude, fear, anger, sadness, guilt, uneasiness, embarrassment
Smith and Bolton (2002)	Smith and Bolton (2002)	Anger, discontent, disappointment, self-pity, anxiety

and Burke (1987) in a natural setting. His emotion words were based on a pre-study, and uncovered a positive and negative factor. Steenkamp et al. (1996) investigated the relations between arousal potential, arousal, and ad evaluation, with need for stimulation as a moderator. They based their arousal dimension on the scale of Mehrabian and Russell (1974).

In the satisfaction literature, Westbrook (1987) was one of the first to investigate consumer emotional responses to product/consumption experiences and their relationship to several central aspects of post-purchase processes. Oliver (1993) extended this work by showing that emotional responses mediate the effects of product attributes on satisfaction. Both studies relied on Izard's (1977) taxonomy of fundamental affects, and found positive and negative affect as underlying emotion dimensions. Mano and Oliver (1993) investigated the structural interrelationship among evaluations, feelings and satisfaction in the post-consumption experience. They combined Watson et al.'s (1988) PANAS scale and Mano's (1991) circumplex scale. Both three dimensions - similar to the upbeat, negative and warmth factors of Edell and Burke (1987) - and two dimensions - positive and negative affect - were uncovered, but only the latter dimensions were used in the studies. Dubé and Morgan (1998) modeled trends in consumption emotions and satisfaction in order to predict retrospective global judgments of services. They used the PANAS scale (Watson et al., 1988) and uncovered positive and negative affect. Phillips and Baumgartner (2002) confirmed the importance of including positive and negative affect in explaining satisfaction. Smith and Bolton (2002) investigated the role of consumer emotions in the context of service failure and recovery encounters. They used content analysis for the responses of the subjects and grouped the (negative) emotion words of consumers in five categories.

Holbrook and Gardner (1993) investigated the relation between the emotional dimensions pleasure and arousal and the duration of a consumption experience, which was in their case listening to music. They used Russell et al.'s (1989) Affect Grid to measure pleasure and arousal of the musical stimuli.

Nyer (1997) and Ruth et al. (2002) focused on defining the antecedents rather than the consequences of emotions. Nyer (1997) showed that the appraisals of goal relevance, goal congruence, and coping potential are determinants of several basic consumption emotions. These emotions were mainly based on Shaver et al. (1987). Ruth et al. (2002) explored the cognitive appraisals of situations and their

correspondence to ten experienced emotions. They also used emotions based on the hierarchical structure of Shaver et al. (1987).

In summary, this overview shows that there is wide divergence in the content of emotions studied in consumer research. Studies often use different scales to measure emotions and focus on different emotions. In spite of this, consumer researchers frequently use, or exploratory data analysis yields, a small number of dimensions (Bagozzi et al., 1999). Among these the classification of emotions in positive and negative affect appears to be the most popular conceptualization (see table 2.1). In the next section we will focus on this classification.

2.2.1 Positive and negative affect

Many papers acknowledge that positive and negative affect are “ever present in the experience of emotions” (Diener, 1999, p.804; see also Berkowitz, 2000; Watson et al., 1999). We have content-analyzed ten seminal studies in psychology on emotions and emotion words (Frijda et al., 1989; Havlena et al., 1989; Morgan and Heise, 1988; Plutchik, 1980; Roseman et al., 1996; Russell, 1980; Shaver et al., 1987; Storm and Storm, 1987; Watson and Tellegen, 1985; Watson et al., 1988). We were able to classify all emotion words as either a positive or negative emotion (see table 2.2). Table 2.2 shows the emotion words and indicates which studies included a particular word as a positive or negative emotion word in their structure. The number of references for each emotion word illustrates to what degree researchers agree that this is an emotion word. For example the emotion words fear, sadness, and happiness appear almost in every emotion structure, whereas others like mournful, forlorn, and zeal are only mentioned occasionally. In addition, table 2.2 supports the notion that there are more negative than positive emotion words (Morgan and Heise, 1988).

Yet which of these many emotion words should be used to measure consumer emotions? To address this issue, we can use the important study by Richins (1997). Based on extensive research, she constructed the Consumption Emotion Set (CES). This scale includes most, if not all, emotions that can emerge in consumption situations and was developed to distinguish the varieties of emotion associated with different product classes. Table 2.2 reveals that the words included in the CES (in italics) are among the most frequently encountered words in the psychological emotion literature, and can be easily divided in positive and negative affect.

Table 2.2. Emotion words

Negative emotion words	Positive emotion words
Aggravation ^{3,7,8} , Agitation ^{3,7,8} , Agony ^{7,8} , Alarm ^{6,7,8} , Alienation ⁷ , <i>Anger</i> ^{1,2,3,5,6,7,8} , Anguish ^{3,7,8} , Annoyance ^{1,2,3,4,6,7,8} , Anxiety ^{1,3,7,8} , Apologetic ⁸ , Apprehension ^{3,7,8} , Aversion ¹ , Awful ⁸ , Bad ⁸ , Bashful ⁸ , Betrayal ⁸ , Bitterness ^{3,7,8} , Blue ^{3,8,9} , Bothered ⁸ , Cheerless ³ , Confused ⁴ , Consternation ⁸ , Contempt ^{1,5,7,8} , Cranky ⁸ , Cross ⁸ , Crushed ³ , Cry ⁸ , Defeat ⁷ , Deflated ^{3,7} , Defensive ⁸ , Dejection ^{3,7,8} , Demoralized ⁸ , <i>Depression</i> ^{3,4,6,7,8} , Despair ^{7,8} , Devastation ⁸ , Different ⁸ , Disappointment ^{1,2,3,7,8} , Discomfort ⁸ , <i>Discontent</i> ^{3,8} , Discouraged ⁸ , Disenchantment ⁸ , Disgust ^{1,3,4,5,7,8} , Dislike ^{5,7,8} , Dismay ^{7,8} , Displeasure ^{3,7,8} , Dissatisfied ^{3,8} , Distress ^{3,5,6,7,8,9,10} , Distrust ^{1,8} , Disturbed ⁸ , Down ^{3,8} , Dread ^{7,8} , Dumb ⁸ , Edgy ⁸ , <i>Embarrassment</i> ^{3,7,8} , Empty ^{3,8} , <i>Envy</i> ^{3,7,8} , Exasperation ⁷ , <i>Fear</i> ^{1,2,4,4,5,6,7,8,9,10} , Fed-up ³ , Ferocity ⁷ , Flustered ³ , Forlorn ⁸ , Foolish ⁸ , Frantic ⁸ , Fright ^{3,4,7,8} , <i>Frustration</i> ^{2,3,5,6,7,8} , Fury ^{3,7,8} , Gloom ^{4,6,7,8} , Glumness ⁷ , Grief ^{2,3,7,8} , Grouchiness ^{7,8,9} , Grumpiness ^{7,8,9} , <i>Guilt</i> ^{1,5,7,8,10} , Heart-broken ^{3,8} , Hate ^{7,8} , Hollow ⁸ , <i>Homesickness</i> ^{3,7,8} , Hopelessness ^{7,8} , Horrible ⁸ , Horror ^{2,3,7,8} , <i>Hostility</i> ^{4,7,8,9,10} , <i>Humiliation</i> ^{7,8} , Hurt ^{3,7,8} , Hysteria ⁷ , Impatient ^{3,8} , Indignant ⁸ , Inferior ⁸ , Insecurity ⁷ , Insult ^{7,8} , Intimidated ⁴ , Irate ^{3,8} , Irked ³ , <i>Irritation</i> ^{3,4,7,8,10} , Isolation ^{7,8} , <i>Jealousy</i> ^{1,3,7,8} , Jittery ^{9,10} , Joyless ³ , Jumpy ⁸ , Loathing ⁷ , <i>Loneliness</i> ^{3,7,8,9} , Longing ⁸ , Loss ⁸ , Lovesick ³ , Low ^{3,8} , Mad ³ , Melancholy ^{7,8} , <i>Misery</i> ^{3,6,7,8} , Misunderstood ⁸ , Moping ⁸ , Mortification ^{3,7} , Mournful ⁸ , Neglect ^{7,8} , <i>Nervousness</i> ^{3,7,8,9,10} , Nostalgia ⁸ , Offended ⁴ , Oppressed ⁸ , Outrage ^{3,7,8} , Overwhelmed ³ , Pain ⁸ , <i>Panic</i> ^{7,8} , Petrified ^{3,8} , Pity ^{3,7,8} , Puzzled ⁴ , Rage ^{1,7,8} , Regret ^{1,3,5,7,8} , Rejection ^{7,8} , Remorse ^{3,7,8} , Reproachful ⁸ , Resentment ^{3,7,8} , Revulsion ⁷ , Ridiculous ⁸ , Rotten ⁸ , <i>Sadness</i> ^{1,2,3,4,5,6,7,8,9} , <i>Scared</i> ^{3,4,8,10} , Scorn ^{7,8,9} , Self-conscious ⁸ , <i>Shame</i> ^{1,3,5,7,8,10} , Sheepish ⁸ , Shock ^{3,7,8} , Shy ⁸ , Sickened ^{3,8} , Small ⁸ , Sorrow ^{1,3,7,8,9} , Spite ⁷ , Startled ^{1,4} , Strained ⁸ , Stupid ⁸ , Subdued ⁸ , Suffering ^{7,8} , Suspense ⁸ , Sympathy ⁷ , <i>Tense</i> ^{6,7,8} , Terrible ⁸ , Terror ^{3,7,8} , Threatened ⁴ , Torment ^{3,7,8} , Troubled ⁸ , Tremulous ⁸ , Ugly ⁸ , Uneasiness ^{3,7,8} , <i>Unfulfilled</i> , Unhappiness ^{3,7,8,9} , Unpleasant ⁴ , Unsatisfied ⁸ , Unwanted ⁸ , Upset ^{1,3,8,10} , Vengefulness ^{7,8} , Want ⁸ , Wistful ⁸ , Woe ^{7,8} , <i>Worry</i> ^{7,8} , Wrath ^{7,8} , Yearning ⁸	Acceptance ^{4,8} , Accomplished ⁸ , Active ^{9,10} , Admiration ⁸ , Adoration ^{7,8} , Affection ^{7,8} , Agreement ⁸ , Alert ^{4,10} , Amazement ⁷ , Amusement ^{3,7,8} , Anticipation ^{2,8} , Appreciation ⁸ , Ardent ⁸ , Arousal ^{3,6,7} , Astonishment ^{6,7,9} , At ease ^{3,6} , Attentive ^{4,10} , Attraction ^{7,8} , Avid ⁸ , Bliss ⁷ , Brave ⁸ , <i>Calm</i> ^{3,6} , Caring ^{7,8} , Charmed ³ , Cheerfulness ^{3,4,7,8} , Comfortable ⁸ , Compassion ^{7,8} , Considerate ⁸ , Concern ⁸ , <i>Contentment</i> ^{3,6,7,8,9} , Courageous ⁸ , Curious ⁴ , Delight ^{3,4,6,7,8} , Desire ^{7,8} , Determined ¹⁰ , Devotion ⁸ , Eagerness ^{7,8} , Ecstasy ^{3,7,8} , Elation ^{3,7,8,9} , Empathy ⁸ , Enchanted ⁸ , <i>Encouraging</i> ⁸ , Energetic ² , Enjoyment ^{2,7,8} , Entertained ⁸ , Enthrallment ⁷ , <i>Enthusiasm</i> ^{1,2,7,8,9,10} , Euphoria ^{7,8} , Excellent ⁸ , <i>Excitement</i> ^{2,3,6,7,8,9,10} , Exhilaration ^{2,7} , Expectant ⁸ , Exuberant ⁸ , Fantastic ⁸ , Fascinated ¹ , Fine ⁸ , Fondness ^{7,8} , Forgiving ⁸ , Friendly ⁸ , <i>Fulfillment</i> ⁸ , Gaiety ^{7,8} , Generous ⁸ , Giggly ⁸ , Giving ⁸ , Gladness ^{3,6,7,8} , Glee ^{7,8} , Good ⁸ , Gratitude ⁸ , Great ⁸ , <i>Happiness</i> ^{1,2,3,4,6,7,8,9} , Harmony ⁸ , Helpful ^{4,8} , High ⁸ , <i>Hope</i> ^{5,7,8} , Horny ⁸ , Impressed ⁸ , Incredible ⁸ , Infatuation ^{7,8} , Inspired ¹⁰ , Interested ^{2,10} , Jolliness ⁷ , Joviality ⁷ , <i>Joy</i> ^{1,2,3,5,7,8} , Jubilation ^{7,8} , Kindly ^{8,9} , Lighthearted ⁸ , Liking ^{5,7,8} , Longing ⁷ , <i>Love</i> ^{1,3,7,8} , Lust ^{7,8} , Merriment ⁸ , Moved ³ , Nice ⁸ , <i>Optimism</i> ⁷ , Overjoyed ^{3,8} , <i>Passion</i> ^{3,7,8} , <i>Peaceful</i> ^{2,8} , Peppy ⁹ , Perfect ⁸ , Pity ⁸ , Playful ⁸ , <i>Pleasure</i> ^{2,3,6,8,9} , Pride ^{1,2,3,5,7,8,10} , Protective ⁸ , Rapture ⁷ , Reassured ⁸ , Regard ⁸ , Rejoice ⁸ , Relaxed ^{2,6,8} , Release ⁸ , <i>Relief</i> ^{1,2,3,5,7,8} , Respect ⁸ , Reverence ⁸ , <i>Romantic</i> ⁸ , Satisfaction ^{2,3,6,7,8,9} , Secure ⁸ , Sensational ⁸ , Sensitive ⁸ , Sensual ⁸ , <i>Sentimentality</i> ^{7,8} , Serene ^{6,8} , <i>Sexy</i> ⁸ , Sincere ⁸ , Strong ^{9,10} , Super ⁸ , Surprise ^{1,2,7,9} , Tenderness ^{7,8} , Terrific ⁸ , Thoughtful ⁸ , <i>Thrill</i> ^{3,7,8} , Touched ³ , Tranquility ⁸ , Triumph ⁷ , Trust ^{4,8} , Victorious ⁸ , <i>Warm-hearted</i> ^{8,9} , Wonderful ⁸ , Worship ⁸ , Zeal ⁷ , Zest ⁷

References: 1 = Frijda et al. (1989); 2 = Havlena et al. (1989); 3 = Morgan and Heise (1988); 4 = Plutchik (1980); 5 = Roseman et al. (1996);
6 = Russell (1980); 7 = Shaver et al. (1987); 8 = Storm and Storm (1987); 9 = Watson and Tellegen (1985); 10 = Watson et al. (1988)

Note: The emotion words of Richins' CES (1997) are in *italics*

Advantages of the division in positive and negative affect are that 1) the model can be kept simple and 2) the combination of a person's positive and negative affect is indicative of his/her attitude. The disadvantage is that important distinctions among different positive and negative emotions disappear (Lerner and Keltner, 2000; 2001). Thus, more precise information about the feelings of the consumer is lost (Bagozzi et al., 1999). Because different emotions can have different behavioral consequences, it is important to know, for example, whether a failure in a product or service elicits feelings of anger or sadness. Both angry and sad people feel that something wrong has been done to them, but whereas sad people become inactive and withdrawn, the angry person becomes more energized to fight against the cause of anger (Shaver et al., 1987). Several studies have shown how important it is to take into account differences across emotions of the same valence (Lerner and Keltner, 2000; 2001; Zeelenberg and Pieters, 1999).

2.2.2 A hierarchy of consumer emotions

The research streams supporting the different emotion structures (positive/negative vs. specific emotions) seem opposing, but can in fact be seen as complementing. Shaver et al. (1987) and Storm and Storm (1987) have suggested that emotions can be grouped into clusters, yielding a hierarchical structure. The most general, superordinate, level consists of positive and negative affect. The next level is considered as the basic emotion level, and the lowest, subordinate, level consists of groups of individual emotions that form a category named after the most typical emotion of that category. Along the lines of the hierarchical structures of Shaver et al. (1987) and Storm and Storm (1987) we thus propose that consumer emotions can be considered at different levels of abstractness.

Our hierarchy of consumer emotions distinguishes between positive and negative affect at the superordinate level. The specific consumer emotions based on Richins' (1997) CES encompass the subordinate level. Which basic emotions should constitute the intermediate level, however, is less clear. Basic emotions are believed to be innate and universal, but because there are different ways to conceive emotions (facial, e.g., Ekman, 1992; biosocial, e.g., Izard, 1992; brain, e.g., Panksepp, 1992), there is also disagreement about which emotions are basic (Turner and Ortony, 1992). Ortony and Turner (1990) have shown that fourteen different emotion theorists proposed fourteen different sets of basic emotions. Table 2.3 shows the usage

frequency of the basic emotions in the different structures reviewed by Ortony and Turner (1990). With few exceptions, the basic emotions from table 2.3 are among the most frequently mentioned emotion words in table 2.2.

Table 2.3. Basic emotions in the psychological literature (adapted from Ortony and Turner, 1990)

Basic emotions
Acceptance ^a , Anger ^{a,b,c,d,e,f,g,h,i} , Anticipation ^a , Anxiety ^{f,h,j} , Aversion ^b , Contempt ^{d,i} , Contentment ^h , Courage ^b , Dejection ^b , Desire ^{b,k} , Despair ^b , Disgust ^{a,c,d,e,f,h,i} , Distress ^{d,i} , Elation ^e , Expectancy ^l , Fear ^{a,b,c,d,e,g,h,i,l,m,n} , Grief ^m , Guilt ^d , Happiness ^{f,h,k,o} , Hate ^b , Hope ^b , Hostility ^h , Interest ^{d,k} , Joy ^{a,c,d,g,i,j} , Liking ^h , Love ^{b,g,h,m,n} , Pain ^{h,p} , Panic ^l , Pleasure ^p , Pride ^h , Rage ^{j,l,m,n} , Sadness ^{a,b,c,f,g,h,o} , Shame ^{d,h,i} , Sorrow ^k , Subjection ^e , Surprise ^{a,c,d,i,k} , Tender ^e , Wonder ^{e,k}

References: ^a Plutchik (1980); ^b Arnold (1960); ^c Ekman et al. (1982); ^d Izard (1971); ^e McDougal (1926); ^f Oatley and Johnson-Laird (1987); ^g Shaver et al. (1987); ^h Storm and Storm (1987); ⁱ Tomkins (1984); ^j Gray (1982); ^k Frijda (1986); ^l Panksepp (1982); ^m James (1884); ⁿ Watson (1930); ^o Weiner and Graham (1984); ^p Mowrer (1960)

To develop a set of basic consumer emotions, we draw on the hierarchical structures of Shaver et al. (1987) and Storm and Storm (1987), and table 2.3. Some basic emotion words are mentioned in most of the structures (see table 2.3). These are anger, fear, love, sadness, disgust, joy, and surprise. Anger, fear, love and sadness are basic emotions in both the structures of Shaver et al. (1987) and Storm and Storm (1987), and will be retained in our structure. Disgust is not included in the structure of Richins (1997) and therefore excluded as a basic consumption emotion.

Surprise was excluded for several reasons. First, it is a neutral emotion (Storm and Storm, 1987) and therefore impossible to classify as a positive or negative emotion. Second, when subjects were required to list emotions, surprise was hardly mentioned (Fehr and Russell, 1984).

Following Storm and Storm (1987) we added the emotion shame to the basic negative emotions. Anger, sadness, and fear are all emotions elicited by situations caused by others or circumstances, whereas shame is caused by a negative action of consumers themselves (Roseman et al., 1996).

The positive emotions can be roughly divided in interpersonal emotions and emotions without interpersonal reference (Storm and Storm, 1987). The interpersonal

emotions are covered by love and its specific emotion words, but there are distinct differences between the emotions that are not interpersonal. Following Storm and Storm (1987) we therefore replaced the more general term joy by the basic emotions contentment, happiness and pride. Contentment is low in arousal and passive, whereas happiness is higher in activity and a reactive positive emotion. Pride, on the other hand, concerns feelings of superiority. Due to these differences we argue that it is better to include these basic emotions separately rather than all under one large basic emotion of joy.

Our proposed hierarchy thus consists of three levels: the superordinate level with positive and negative affect, the basic level with four positive and four negative emotions, and the subordinate level with specific emotions. The final result can be seen in figure 2.1. Next, we will conduct a preliminary test of our hypothesized structure.

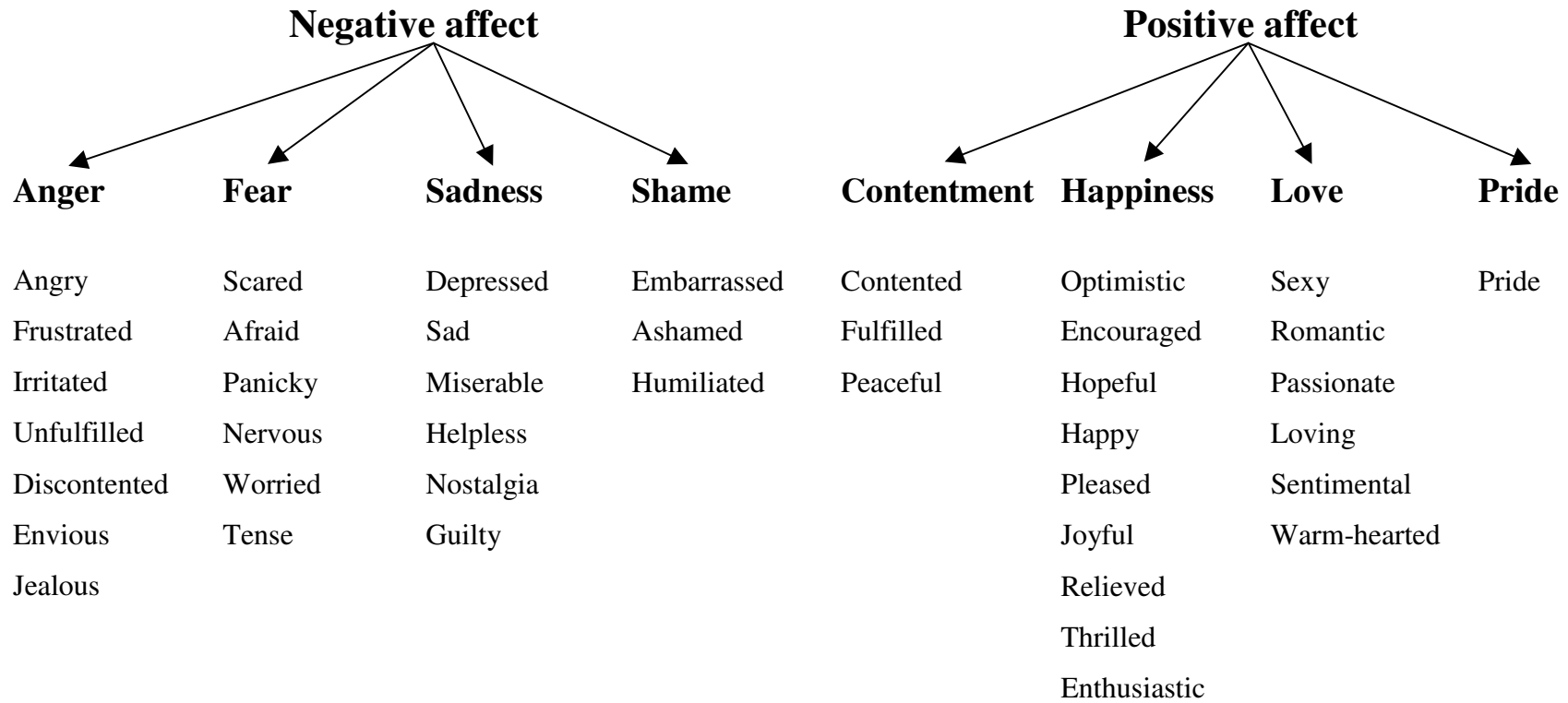
2.3 METHOD

2.3.1 Sample and procedure

Data were collected in a nationally representative sample among 645 Dutch consumers using a questionnaire. The market research agency GfK carried out the data collection. Of the respondents, 53.6% were women, 58.3% were responsible for the daily grocery shopping, and 69.1% were the main wage earner of the household. The average household size was 2.39 persons and all levels of education and income were represented. The average age was 48 years and ranged between 16 and 91 with a fairly normal spread.

Respondents were asked to indicate to what extent they experience 33 specific emotions for one (randomly assigned) type of food (genetically modified food, functional food, organic food, or regular food). Thus, we measure emotions at a general, product-type level of categorization. In The Netherlands, these types of foods are widely known, the exception being functional foods (this was confirmed in discussions with industry experts). Therefore, respondents who rated their emotions for functional foods received additional explanation: “Functional foods are food products that have been enriched or modified. The reason for this is to make the

Figure 2.1. Hierarchy of consumer emotions



product healthier or to prevent diseases (e.g., milk with extra calcium, margarine with additives to lower the cholesterol level).”

2.3.2 Measures

With some exceptions, the emotion words shown in figure 2.1 were used. Emotions were rated on a five-point Likert scale ranging from “I feel this emotion not at all” (1) to “I feel this emotion very strongly” (5). In our empirical test we omitted the basic emotions “love” and “pride”, and the emotion words “envious” and “jealous”. “Love” is demonstrated to be mainly experienced in the case of sentimental products, like mementos and gifts (Richins, 1997). The latter three emotions are interpersonal and less applicable in the case of widely available food. The emotion “pride” generally occurs when a consumer feels superior compared to another person, whereas the emotions “envy” and “jealousy” occur when consumers feel that another person has something more or better than them. Thus, the basic emotions in our analyses are as follows: anger, fear, sadness, shame, contentment and happiness, measured in total by 33 specific emotion words.

2.3.3 Stability of the emotions structure across food types

Before we can test our second-order hierarchical model of consumer emotions, we have to establish whether we can pool the data across the four food types. We do this in two ways. First, we assess whether principal component analysis yields the same factor structure in each of the four food groups. The Bartlett’s test of sphericity is significant for all four foods, and the measure of sampling adequacy ranges between .86 (organic food) and .92 (genetically modified food), which means that principal component analysis can be applied. The scree test indicated two factors in all four groups, explaining between 48% (regular food) and 60% (genetically modified food) of the variance. The factor structures (after rotation) were highly similar, Tucker’s congruence coefficient always being greater than .95 ($p < .01$; Cattell, 1978).

A second way to assess the similarity of the four food groups is to test for the invariance of the covariance matrices across the four groups using LISREL 8.50 (Steenkamp and Baumgartner, 1998). The fit was good given the large sample and high number of degrees of freedom (Baumgartner and Homburg, 1996): $\chi^2(1683) = 3845.90$ ($p < .001$); CFI = .86; TLI = .82. Hence, we can pool the data across the different food types.

2.4 RESULTS

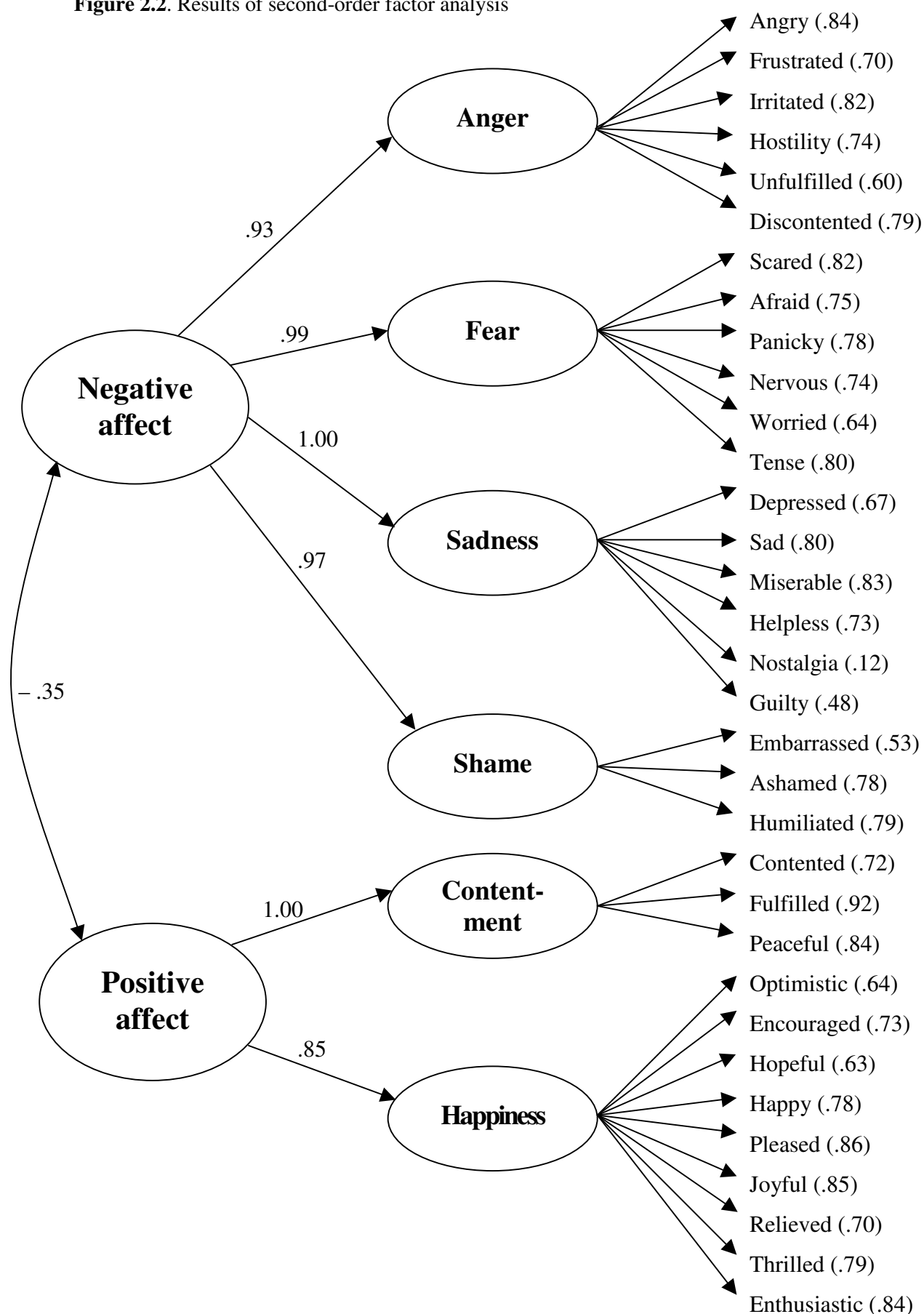
2.4.1 Testing the proposed model

We used LISREL 8.50 to test the proposed hierarchical consumer emotions model. The standardized parameter estimates of the second-order factor analysis are reported in figure 2.2. Model fit is acceptable: $\chi^2(490) = 3036.79$ ($p < .001$), CFI = .84, TLI = .83. Although the chi-square value was highly significant (not unexpected given the large sample size; Anderson and Gerbing, 1988), other indicators suggest reasonable model fit, especially considering that fit is adversely affected by model complexity (Baumgartner and Homburg, 1996; Bollen, 1989; Bone et al., 1989). In addition, the fit measures are in line with simulation results (see Gerbing and Anderson, 1993, for a review) and compare favorably to other models with similar degrees of freedom (e.g., Netemeyer et al., 1991; Richins and Dawson, 1992; Wong et al., 2003).

All factor loadings were significant at $p < .001$, the average loading being .73. Only the factor loading of the emotion nostalgia on the basic emotion sadness was below .40. A possible explanation for this is that nostalgia involves complex emotional responses and can have both a positive and a negative connotation (Holak and Havlena, 1998). The correlation between the second-order factors positive and negative affect was significant ($r = -.35$, $p < .01$), confirming earlier results found in consumer research (e.g., Westbrook, 1987; Phillips and Baumgartner, 2002).

These results support the convergent and discriminant validity of our model (Steenkamp and Van Trijp, 1991). The reliability of our measures was high. Cronbach alphas were $\alpha = .94$ and $\alpha = .95$ for the dimensions positive and negative affect, respectively. The basic emotions yielded the following reliabilities: anger ($\alpha = .88$), fear ($\alpha = .88$), sadness ($\alpha = .76$), shame ($\alpha = .74$), contentment ($\alpha = .86$) and happiness ($\alpha = .92$).

Figure 2.2. Results of second-order factor analysis



Note: Reported are standardized coefficients. All coefficients significant at $p < .05$.
First-order factor loadings are reported in parentheses after the specific emotions.

2.4.2 Comparison of the superordinate level with the basic emotions

Although the emotion structure is similar for the four food groups, that does not imply that the various foods evoke the same emotional intensity. Table 2.4 provides the mean scores for the superordinate dimensions positive and negative affect and for the basic emotions.

Table 2.4. Differences in the intensity of the superordinate and basic emotions for the food groups

Emotion	GMF	Functional	Organic	Regular	F	p-value
<i>Negative affect</i>	1.99 ^a	1.45 ^b	1.43 ^b	1.46 ^b	31.25	< .001
Anger	2.19 ^a	1.51 ^b	1.47 ^b	1.55 ^b	34.49	< .001
Sadness	1.79 ^a	1.46 ^b	1.47 ^b	1.47 ^b	11.99	< .001
Fear	2.16 ^a	1.57 ^b	1.40 ^c	1.43 ^c	46.06	< .001
Shame	1.65 ^a	1.32 ^b	1.29 ^b	1.31 ^b	11.30	< .001
<i>Positive affect</i>	1.68 ^a	2.41 ^{bc}	2.32 ^c	2.48 ^b	40.09	< .001
Contentment	1.82 ^a	2.69 ^b	2.40 ^c	2.81 ^b	47.38	< .001
Happiness	1.64 ^a	2.32 ^b	2.29 ^b	2.37 ^b	33.64	< .001

Note: Different superscripts reflect a significant difference at a p-value < .05.

ANOVA with multiple comparisons (LSD) was used to investigate whether the mean values across food groups are significantly different. Subjects experience significantly more negative affect and less positive affect for genetically modified foods than for the other food groups. Yet, the basic emotions show differences among the food types that would have been lost if only positive and negative affect had been considered. Both the basic emotions fear and contentment contain additional subtle distinctions across the food groups. The negative affect experienced by consumers is similar for functional, organic, and regular food. Yet, consumers feel a lot more fearful concerning functional food than for organic and regular food. Concerning the positive emotions, contentment has very low values for organic food compared to functional and regular food. These nuances, however, are wiped away for positive affect.

To demonstrate the usefulness of basic emotions for understanding the consumer's feelings we will take a closer look at one of the food groups. Genetically modified food represents a controversial topic in contemporary society, and previous research (e.g., Bredahl, 2001) has shown that consumers have a rather negative attitude toward this type of food. The scores on negative and positive affect support this, but the basic emotions indicate more clearly how consumers feel. Participants do

not feel sad or ashamed, but are very angry and afraid. This means that they feel energized and powerful rather than inactive, and feel that they themselves are not to be blamed, but someone else is. In addition, genetically modified food elicits strong associations of risk and uncertainty leading to feelings of fear.

2.5 CONCLUSIONS

Based on our literature review we concluded that despite the different ways to measure emotions, positive and negative affect are frequently employed as general emotion dimensions. Important nuances, however, are lost if emotions of the same valence are collapsed together. This chapter therefore proposed a hierarchical model of consumer emotions (figure 2.1) to integrate the different research streams concerning emotion content and structure. This model specifies emotions at three levels of generality. At the superordinate level it distinguishes between positive and negative affect. This is generally considered to be the most abstract level at which emotions can be experienced (e.g., Berkowitz, 2000; Diener, 1999). At the level of basic emotions, we specify four positive (contentment, happiness, love, and pride) and four negative (sadness, fear, anger, and shame). At the subordinate level, we distinguish between 42 specific emotions based on Richins' (1997) CES. Our empirical study provides support for the proposed model and suggests that the basic emotions allow for a better understanding of the consumers' feelings concerning certain food products compared to only positive and negative affect. Note that not in all situations this model need be used as a whole. Dependent on the research question, only part of the model may be used. However, even in such cases, the researcher can still relate his/her specific results to the broader structure of our emotions. This makes it easier for emotions research to cumulatively build on each other and to identify gaps in our knowledge.

Our study has several limitations, which offer avenues for future research. First, we excluded two basic emotions (love and pride) from our empirical analysis. Future research is needed to validate the whole hierarchy of emotions, and to test our model on other products and services. Second, future research can expand the set of specific consumer emotions. Possible candidates include the negative emotions regret and disappointment that recently received a great deal of attention in consumer

research (e.g., Inman and Zeelenberg, 2002; Tsiros and Mittal, 2000; Zeelenberg and Pieters, 1999). Regret stems from bad decisions, whereas disappointment originates from disconfirmed expectancies (Zeelenberg and Pieters, 1999). We thus propose that regret can be positioned under the basic emotion shame, and disappointment under the basic emotion sadness (Zeelenberg et al., 1998), but future research should investigate this.

Third, future research can investigate whether the set of basic emotions has greater explanatory power than positive and negative affect. Our exploratory analysis indicates this, but future research should test this hypothesis. Fourth, we tested our emotions model in The Netherlands. The further advancement of consumer research as an academic discipline requires that the validity of our theories and measures and their degree of general validity and boundary conditions be tested in different countries (Steenkamp and Burgess, 2002).

CHAPTER 3

IMPORTANCE OF FEAR IN THE CASE OF GENETICALLY MODIFIED FOOD¹

3.1 INTRODUCTION

Gene technology, and genetically modified food (GMF) in particular, are a controversial topic in today's society. On the one hand a (small) group of experts welcomed GMF as the food of the future and as a way to reduce hunger in the Third World. On the other hand the public at large is very afraid of the "Frankenstein food" (Fricker, 2002; Smits, 2002; Wales and Mythen, 2002). The combination of high uncertainty, severe (perceived) risk and low perceived benefits of GMFs is sufficient to make consumers scared and to reject the technology and its applications altogether (Grunert, 2002).

At this moment there are no GMFs on the European market, and if it depends on the fearful consumer this will remain the case. Surveys show that even if a genetically modified product would provide a clear consumer benefit (e.g., genetically modified product contains less pesticide residues, or is cheaper) between 48% and 66% of the European consumers would still reject it (European Commission, 2003). Companies, like Marks and Spencer, McDonalds, Sainsbury and Tesco in the UK, Nestle in Switzerland, Carrefour in France, McCains in Canada, and Frito Lay in the US have responded to these developments by stating that they will only accept/sell non-GM products (Giannakas and Fulton, 2002). Food companies are afraid that whoever markets genetically modified products will see its sales decrease and receive negative public attention (Wales and Mythen, 2002). The market potential of GMF thus seems small due to the intense fear as a result of the risk and uncertainty associated with the technology. Consumer fears are enhanced by the numerous fear appeals concerning GMF that frequently appear in the mass media. Table 3.1 provides

¹ This chapter is based on Laros, Fleur J.M., and Jan-Benedict E.M. Steenkamp (2004), "Importance of Fear in the Case of Genetically Modified Food," *Psychology and Marketing*, 21 (11), 889-908

some illustrative examples of fear messages that have appeared in various British, Canadian, Dutch, and U.S. media.

Many of these messages appeal directly to our fears by using terms like ‘Frankenfoods’, ‘unreliable’, ‘fears’, ‘disaster’ and ‘risk’. The content of the messages is consistent with the appraisals that belong to fear (Roseman et al., 1996). Due to the proposed “environmental risks”, “risks of cancer”, and “food health fears”, the public gets the feeling that GMFs are a major problem that affect both the natural habitat and the health of the world’s population. Feelings of low control potency are evoked as a result of “escaping modified crops”, “contamination spread”, “GM crops need long term monitoring”, and “scientists can get things wrong”. Here the public has the feeling that neither they nor the scientists themselves can control genetically modified crops, which is a scary thought. Uncertainty is elicited by terms like “may pose risks”, “unreliable”, “source of dispute”, “raises risk”, and “experts discuss concern”. And all the possible consequences are negative, as can be seen by “cancer risk”, “environmental risk”, “health fears”, “kill”, and “disaster” (table 3.1). The outcome of these fear appeals is a fearful consumer. Recent studies have shown that the term “genetically modified” itself elicits enough fear to dilute all the effects of the positive information around it, and that consumers rely strongly on all the negative information they receive (Scholderer and Frewer, 2003).

Thus, it appears that the emotion fear plays a crucial role in consumer attitudes and behavior concerning GMF. Consistent with this observation, the purpose of this chapter is threefold. First, we validate a scale to measure fear of consumers for GMF. Second, we will examine the socio-demographic correlates of consumers’ fear of GMF. Third, we will develop and test a conceptual model of key antecedents and consequences of fear of GMF.

This chapter is organized as three distinct, but interrelated, studies. Study 1 focuses on the scale validation of the emotion fear and compares the intensity of fear of GMF with fear levels evoked by two other relatively “new” types of food (functional food and organic food). We use regular food as a benchmark. Study 2 explores the differences in fear of GMF between individual consumers. Study 3 examines several key antecedents and consequences of the fear consumers experience when confronted with GMF. The data for the three studies were gathered in a single data collection and each of the studies draw on different parts of the data.

Table 3.1. Fear appeals in the mass media: Recent headings concerning genetic modification of food

Heading	Source	Summary
Public fears lead to drop in GM trials	Independent News: UK, 20 March 2003	The number of research projects into genetically modified plants and animals has plunged in the wake of public safety fears, according to a Europe-wide survey to be published.
Agriculture experts discuss concern over pollen drift from biotech crops	Associated Press: US, 17 March 2002	Agriculture experts say there is a renewed concern that pollen from genetically engineered crops could drift to nearby fields, contaminating grain intended for use in food.
Frankenfoods – The truth at last	Daily Mail: UK, 6 February 2002	Consumers and supermarkets in the UK had every right to be suspicious, because the latest research on genetic modification shows that cultivation of these foods create ‘superweeds’, and they could damage a person’s health.
Europe shows little taste for US biotech crops	Chicago Tribune: US, 30 October 2002	Consumers in Europe and also elsewhere are very afraid for genetic modification of food, and refuse to consume it or to accept it in their countries.
GM crops need long-term monitoring	BBC News: UK, 27 May 2003	Genetically modified (GM) crops will need monitoring for years if they are grown in the UK, according to British scientists from the Royal Society.
Farmers fret over ‘frankenfoods’	Calgary Herald: CA, 22 April 2003	Alberta crop producers are worried, because a study soon-to-be-released by the University of Alberta says that an overwhelming majority of Canadians want so-called "frankenfoods" clearly labelled as genetically modified products.
Scientist who pressed GM panic button raises new food health fears	Sunday Times: UK, 4 May 2003	Arpad Pusztai (the scientist who shocked the world with research claiming that genetically modified (GM) crops might damage human health) is to release new findings supporting his warnings. It warns that the work carried out by biotechnology companies into the human health hazard from GM food is inadequate and unsafe. It also points to technical defects in the way GM plants are created.

GM crops unreliable and a disaster	Evening Standard: UK, 3 June 2003	A report by an international panel of researchers claims that genetically modified crops fail to produce significant reductions in pesticides and are "a disaster waiting to happen".
"Super corn" source of dispute	Telegraaf: NL, 24 August 2002	Even though in the south of Africa millions of people are hungry, until recently all the African countries refused to accept genetically modified corn from the US.
Blair faces huge resistance to his support for GM crops	Independent News: UK, 28 April 2003	Opposition to genetically modified crops and foods remains formidable, new research reveals, as the Government gears up to take the crucial decision on whether GM crops should be grown commercially in Britain.
Interbreeding GM crops 'raises risk of superweeds'	Independent News: UK, 3 January 2003	Genes from genetically modified crops are interbreeding with other crops and weeds, a government report has found.
Possible Frankenfish ban in California spooks industry	San Francisco Chronicle: US, 29 April 2002	The altered salmon is likely to become the next focus in the battle over bio-engineered food. Already, the prospect of mutant fish escaping and disrupting already threatened wild populations has prompted lawmakers in several states to take pre-emptive steps. California could become the first state to ban transgenic fish outright.
Face the facts: Scientists can get things wrong	Independent: UK, 23 May 2002	Fear of genetically modified organisms is not confined to the non-scientific world. In fact, a statement first drawn up by the Institute of Science in Society three years ago, which calls for a moratorium on the environmental release of genetically modified crops, has now been signed by over 450 scientists from over 50 different countries.
GM could kill off organic farms	Observer: UK, 26 May 2002	Organic farming in Britain could be doomed if the Government approves the cultivation of genetically modified crops, according to a European Union report warning that it is 'virtually impossible' to stop cross-contamination.
Genetic threats blowin' in the wind: Scientists warn modified crops are 'escaping and going rogues'	National Post: CA, 7 June 2002	Wayward pollen and seed from genetically modified crops have cost Canadian honey producers and organic farmers millions of dollars, according to researchers who say there is an urgent need to better control the controversial GM crops and their novel genetic machinery.

GM contamination spreads in Mexico	BBC News: UK, 9 June 2002	Recent reports from Mexico suggest that despite a moratorium on planting GM corn strains, wild varieties have become contaminated by laboratory developed plants. The most heavily contaminated area is in Oaxaca, where up to a quarter of corn samples have tested positive for GM.
Gene-altered canola pollen can spread to other fields	Wall Street Journal: US, 28 June 2002	A new study has shown that the pollen of genetically modified canola can spread over wide areas into neighboring fields. That study, together with other recent reports of similar cross-pollination, have farmers concerned about possible legal fallout.
Fears over GM farm animals	BBC News: UK, 3 September 2002	Stricter controls on the development of genetically modified (GM) and cloned animals should be put in place to avoid "mistakes", a panel of experts has said.
Genetically modified animals may pose environmental risks	Wall Street Journal: US, 21 August 2002	The National Academy of Sciences struck a cautionary note in a new report on genetically modified animals, warning that they could pose environmental risks that the government might not be equipped to evaluate.
Genfood creates barrier between US and Europe	De Volkskrant: NL, 55 June 2003	Europe demands from the US to show that the "Frankenstein food" is safe, whereas President Bush claims that the fear of the opponents of genfood is only based on 'unscientific fears'.
Bush: fear of gmo is unscientific	NRC Handelsblad: NL, 24 June 2003	The US is the largest producer of GMFs and tries to inhibit the ban of the European Union on the import of GMFs. They claim there is no scientific proof that supports any risk for the world population.
GM expert warns of cancer risk from crops	Sunday Herald: UK, 8 December 2002	Dr Stanley Ewen, a consultant histopathologist at Aberdeen Royal Infirmary, says that a cauliflower virus used in GM foods could increase the risk of stomach and colon cancers. He is calling for the health of people who live near the farm-scale GM crop trials in Aberdeenshire, Ross-shire and Fife to be monitored. Their food and water will be contaminated by GM material, he said, which could hasten the growth of malignant tumors.

3.2 STUDY 1: SCALE VALIDATION OF FEAR ACROSS DIFFERENT FOOD TYPES

The purpose of study 1 is to measure the level of fear and to validate the proposed fear scale across four major types of foods: GMF, functional food, organic food, and regular food (serving as benchmark). They all play an important yet very diverse role in the societal debate concerning food safety and public health. Regular food is the “mainstream” food you buy in the supermarket. Functional foods are processed with a relatively high degree of technological manipulation. They are enriched with various kinds of (natural) substances (e.g., vitamins, minerals or probiotic cultures) or modified so as to provide consumers with an additional physiological benefit presumed to prevent disease or promote health, without them having to change their eating habits fundamentally (Bech-Larsen et al., 2001). Since functional foods are still in their introduction phase they have to deal with sudden food scares resulting from process problems and (claimed) unwanted side effects. Organic food is produced according to “natural” growing processes, which means that the use of synthetic fertilizers and chemical pesticides is avoided or largely excluded (Schifferstein and Oude Ophuis, 1998). Its advocates believe organic food is the solution to public safety and health concerns. GMF is food produced with gene technology. We expect that there will be heterogeneity among the different types of food in the amount of fear that they elicit. GMF will elicit more feelings of fear than other types of food.

In this study we propose a scale to measure fear. This raises several related issues, including how emotions should be measured and what is the dimensional structure of fear emotions. Measurement of emotions ranges from the use of physiological measurements (e.g., facial expressions; see e.g., Ekman, Friesen, and Ancoli, 1980) to the use of lexicographic measures. Lexicographic measures range from events that consumers have to rate or describe (see appraisal theory, e.g., Roseman et al., 1996) to the ratings of a priori specified emotion words (see e.g., the emotion measures of Plutchik, 1980, and DES-II of Izard, 1977). Despite their shortcomings, lexicographic measures are widely employed in the psychological literature, due to their ease of use and straightforward interpretation. It has been demonstrated that subjects are in general quite capable of indicating their feelings on paper, and this also turns out to be the case for research involving consumer behavior

situations (Holbrook and Batra, 1987; Mano and Oliver, 1993; Oliver, 1993; Westbrook, 1987; Westbrook and Oliver, 1991). The lexicographic method will also be applied here.

Fear is a basic emotion and one that many emotion researchers include in their studies (Izard, 1977; Plutchik, 1980; Shaver et al., 1987). However, fear has been conceptualized and measured in different ways: either as a unidimensional, single item instrument (Russell, 1980; Watson et al., 1988; Watson and Tellegen, 1985), as a unidimensional, multi-item instrument (Havlena et al., 1989; Izard, 1977; Plutchik, 1980) or as a multidimensional, multi-item instrument (Shaver et al., 1987). The use of single-item measures is typically not recommended, due to well-known psychometric limitations (Churchill, 1979).

The multidimensional operationalization has received only limited support in the literature (Bagozzi et al., 1999) while multi-item unidimensional measures have performed well in previous research, including the seminal work of Izard (1977) and Plutchik (1980). Plutchik (1980) argued that fear should be defined by items ranging from apprehension to terror. Other researchers (Shaver et al., 1987; Storm and Storm, 1987) distinguished these as two subdimensions of fear. Yet it is hardly possible to discriminate them, as both reflect “some level of threat to the well-being of the person or his or her kin, either in a contemporary or an evolutionary perspective” (Ohman, 1993). The unidimensional concept is supported by Russell's (1980) circumplex model of affect where apprehension emotions (tense and nervousness) are grouped in a cluster of fear emotions.

A disadvantage of the use of the emotion words apprehension and terror is that they are hardly used in consumption situations, whereas it is important that respondents easily comprehend the items (Rossiter, 2002). We therefore used words from the Consumption Emotion Set (Richins, 1997). We combined Richins' (1997) two emotion factors fear and worry to attain the proposed breadth of the fear construct. The emotion words thus included are: afraid, scared, panicky, nervous, tense, and worried.²

² This was supported by confirmatory factor analysis on the six fear items. Pooled across the four types of food (see below), the disattenuated correlation of .99 between the Richins factors of fear and worry indicated a lack of discriminant validity and supported our conceptualization of fear as a single factor.

3.2.1 Method

Sample and procedure

Data were collected in a nationally representative sample among 645 Dutch consumers using a questionnaire. The market research agency GfK carried out the data collection. Of the respondents, 53.6% were women, 58.3% were responsible for the daily grocery shopping, and 69.1% were the main wage earner of the household. The average household size was 2.39 persons and all levels of education and income were represented. The average age was 48 years and ranged between 16 and 91 with a fairly normal spread.

Respondents were asked to indicate to what extent they experience the six fear emotions (afraid, panicky, scared, worried, nervous, and tense) for one (randomly assigned) type of food (genetically modified food, functional food, organic food, or regular food). Emotions were rated on a five-point Likert scale ranging from “I feel this emotion not at all” (=1) to “I feel this emotion very strongly” (=5). Thus, we measure emotions at a general, product-type level of categorization. In The Netherlands these types of foods are widely known, the exception being functional foods (this was confirmed in discussions with industry experts).³ Therefore, respondents who rated fear of functional foods received additional explanation: “Functional foods are food products that have been enriched or modified. The reason for this is to make the product healthier or to prevent diseases (e.g. milk with extra calcium, margarine with additives to lower the cholesterol level).”

Analytical procedure

For scale validation the sequential multi-group testing procedure proposed by Steenkamp and Baumgartner (1998) was used. This procedure was originally designed for multiple countries, but can also be applied to test the generalizability of a scale across multiple food groups. Fear was conceptualized as a one-factor model and validated across several levels of invariance. The scale validation analyses were conducted on item means and covariances using LISREL 8.50.

Configural invariance. The first step considers the pattern of factor loadings across groups. The factor structure of the construct should be similar across the four

³ Bredahl (1999) suggests that in case of GMF consumers reject the technology overall rather than products on a case-by-case basis. European-wide studies also suggest that there is no cognitive distinction between product and process related beliefs (Bredahl, 2001). Thus, using the general term “genetically modified food” rather than specific products is justified.

food groups. This implies that in order for configural invariance to be accepted, fit of the one-factor model has to be acceptable, and the factor loadings of all six fear emotions should be significantly different from zero for all four food groups.

Metric invariance. Configural invariance only indicates that across the four food groups, the six emotions belong to the latent construct fear, but not to what extent consumers respond similarly to an item across different foods. If an item satisfies the requirement of metric invariance, difference scores on the item can be meaningfully compared across different types of foods. These observed item differences are indicative of similar differences across foods in the underlying construct of fear.

Scalar invariance. If metric invariance is satisfied, scalar invariance can be assessed. Scalar invariance implies that differences in the means of the observed fear items across food types are due to differences in the means of the underlying fear construct. It addresses the question whether there is consistency between cross-food differences in fear and cross-group differences in observed means. Even if a fear item measures the latent fear construct with equivalent metrics in different types of food (metric invariance), scores on that item can still be systematically upward or downward biased. Meredith (1995) refers to this as additive bias. Comparisons of means between types of foods based on such additively biased items is meaningless unless this bias is removed from the data (Meredith, 1993). Empirically, scalar invariance is tested by imposing the constraint of equal item intercepts on the model of metric invariance. Note that *full* metric and scalar invariance is not required. Steenkamp and Baumgartner (1998) show that even when partial metric or scalar invariance is obtained, one can still validly compare latent (fear) means and variances across groups, corrected for measurement error.

3.2.2 Results

The correlations between the fear emotions were all highly significant (ranging from $r = .38$ to $r = .66$) and the internal reliability was high (Cronbach's alpha ranged from .76 for organic food to .90 for genetically modified food).

Table 3.2. Invariance tests of the fear scale across four types of food

	χ^2 value	df	CAIC	CFI	TLI
Configural invariance	150.13	36	678.32	0.93	0.88
Metric invariance	184.68	51	598.56	0.92	0.90
Initial scalar invariance	233.75	66	540.16	0.90	0.90
Partial scalar invariance	209.81	65	521.94	0.91	0.92
Latent construct variance invariance	290.09	68	586.73	0.86	0.88

Configural invariance. This is the baseline model against which the other models can be compared (for fit statistics see table 3.2). The fit of the configural invariance model was acceptable: $\chi^2(36) = 150.13$ ($p < .001$), Comparative Fit Measure (CFI) = .93, and Tucker-Lewis Index (TLI) = .88. The Consistent Akaike Information Criterion (CAIC) of this model was 678.32. All factor loadings were highly significant and thus it can be concluded that the fear scale exhibited configural invariance across the four food groups.

Metric invariance. By constraining the matrix of factor loadings to be invariant across the food groups, the hypothesis of full metric invariance was tested. As can be seen in table 3.2, the equality of factor loadings was supported. Although the increase in chi-square between the model of configural invariance and metric invariance is significant ($\Delta\chi^2(15) = 34.55$, $p < .01$), which is not unexpected (Steenkamp and Van Trijp, 1991), CFI declined an insubstantial .01 (Widaman, 1985), whereas TLI and CAIC, which take both model fit and parsimony into account, actually improved. These results provide strong evidence concerning metric invariance of the proposed fear scale (Steenkamp and Baumgartner, 1998).

Scalar invariance. The next step imposes equal item intercepts on the model. Because full metric invariance was obtained, the intercepts of all factor loadings were constrained to be equal across the food groups. Full scalar invariance was not supported. The increase of the chi-square was highly significant ($\Delta\chi^2(30) = 83.62$, $p < .001$), and CFI also showed a fairly substantial worsening of the fit ($\Delta\text{CFI} = .02$). The modification indices indicated that this was largely due to lack of scalar invariance for one item (worry) in one group (GMF; modification index = 23.09). Relaxing this constraint yields a substantial and highly significant improvement in fit as compared to the full scalar invariance model: ($\Delta\chi^2(1) = 23.94$, $p < .001$). Despite a significant

Table 3.3. Parameter estimates of the partial scalar invariance model

Item	Factor loading	Item intercepts			
		GMF	Functional food	Organic food	Regular food
Nervous	1.00	1.23 (32.84)	1.23 (32.84)	1.23 (32.84)	1.23 (32.84)
Afraid	1.22 (19.02)	1.36 (29.77)	1.36 (29.77)	1.36 (29.77)	1.36 (29.77)
Worried	1.06 (12.70)	2.55 (26.89)	2.06 (37.77)	2.06 (37.77)	2.06 (37.77)
Scared	1.35 (20.19)	1.39 (28.30)	1.39 (28.30)	1.39 (28.30)	1.39 (28.30)
Tense	1.16 (18.46)	1.34 (30.15)	1.34 (30.15)	1.34 (30.15)	1.34 (30.15)
Panicky	0.89 (17.38)	1.16 (34.30)	1.16 (34.30)	1.16 (34.30)	1.16 (34.30)
Latent means		0.59 (7.89)	0.13 (2.13)	-0.02 (-0.41)	0
Latent variances		0.87 (7.19)	0.32 (6.65)	0.16 (6.35)	0.16 (6.69)

Note: t-values are given in parentheses

increase in chi-square ($\Delta\chi^2(14) = 25.13, p = .05$) relative to the metric invariance model, model fit improved when considering CAIC and TLI (CAIC = 521.94 and TLI = .92), while CFI declined an insubstantial .01. When comparing the model of partial scalar invariance to the configural invariance model, CFI declines insubstantially, while CAIC and TLI improved. Thus partial scalar invariance is supported. The parameter estimates of the final partial scalar invariance model are reported in table 3.3. The intercept for the item worry is significantly higher for genetically modified food than for the other food groups. Compared to the other food groups, GMF elicits worry over and above “warranted” by the amount of fear it generates.

Table 3.3 also shows the latent means and latent variances of the underlying fear factor. Given that partial scalar invariance has been achieved, these estimates can be validly compared across different types of foods. The latent means were estimated relative to the intensity of fear elicited by regular food, whose mean had been constrained to zero to define the origin of the scale (Steenkamp and Baumgartner, 1998). The latent fear mean for organic food was similar to that of regular food, while the latent mean for functional food was significantly ($p < .05$) higher. Functional food thus elicited more fear than regular or organic food. Despite the consumer benefits of functional foods, consumers are somewhat afraid about the level of engineering that is necessary to produce this benefit. As expected, GMF evoked significantly (p 's $< .001$) more fear than any of the other food types.

The variance in fear also differed significantly across food groups. Constraining all variances to be equal led to a significant increase in χ^2 ($\Delta\chi^2(3) = 90.28, p < .001$), and the other fit measures also worsened considerably.⁴ The variance in fear elicited by organic food and regular food was quite small. Consumers were fairly homogenous in their (low) level of fear of these foods. Both types of food are also widely accepted and trusted in Dutch society. Functional food had a larger variance than organic and regular food. As mentioned above, this is a new type of food about which some consumers may yet be uncertain. Relatedly, there is also ambiguity concerning the real value of functional foods, as the exact benefits are not always obvious. A recent example is the case of Unilever's functional margarine *Becel Pro-Activ* which is claimed to reduce cholesterol, due to a specific component added to the margarine. A Swedish consumer organization recently reported too high

⁴ The variances for GMF and functional food were different from each other and from organic food and regular food (p 's $< .01$).

levels of cancer-enhancing substances, thereby creating fear among some consumers and consequently a decline in sales.⁵ Functional food thus has to cope with sudden shocks and food crises, leading to a higher variance in fear.

GMF had the highest variance in fear elicited, brought about by, for example, fear appeals that appear in the mass media (see table 3.1). Most consumers are very fearful about genetic modification of food but some are in favor, leading to widely dissimilar feelings. This polarization of opinions is a widely known phenomenon (Cooley, 2002). It also occurred in the early 1980's with respect to nuclear energy (Smits, 2002). In sum, fear emotions were on average low and fairly homogenous for organic and regular food, high and most divergent for GMF, with functional food in between.

3.3 STUDY 2: SOCIO-DEMOGRAPHIC CORRELATES OF FEAR OF GMF

Study 2 examines whether the intensity of fear generated by GMF is systematically related to the socio-demographic makeup of the consumer. Is it possible to classify consumers based on their socio-demographics, so that those who are most or least fearful can be identified? Given the relatively paucity of prior theoretical and empirical evidence, we will investigate the effects of the socio-demographics in an exploratory fashion.

3.3.1 Procedure

The data that we analyzed for this study are part of the previously used dataset. Here only those respondents were included that rated their emotions concerning GMF. This subset consists of 164 respondents that are similar in their characteristics to the total sample. Information on the following socio-demographics was obtained: age (in years), gender (1 = male, 0 = female), household size (in number of persons living in the household), level of education (measured by level of schooling), household income (net monthly household income in Euros), responsibility for the daily grocery shopping (1 = yes, 0 = no), and main wage earner of the household (1 = yes, 0 = no). Measurement of fear was discussed in Study 1.

⁵ Follow-up testing revealed that the scare was unwarranted. Test results were due to a contaminated sample in the consumer testing laboratory, rather than to high levels of cancer-enhancing substances in *Becel Pro-Activ* (*De Volkskrant* 2003).

3.3.2 Results

We used LISREL 8.50 to test for the effect of the socio-demographics on fear of GMF. Model fit is satisfactory: $\chi^2(44) = 79.53$, CFI = .96, TLI = .93. The parameter estimates of the effects of the socio-demographics on fear of GMF are reported in Table 3.4. There was a weak negative association between fear and education ($\beta = -.13$, $t = -1.41$), indicating that consumers with a higher education were less afraid of GMF than consumers with a lower education. Further, men tended to experience less fear than women ($\beta = -.17$, $t = -1.35$), and older people experienced less fear than younger consumers ($\beta = -.20$, $t = -1.76$), but these results were marginally significant at best. Our findings are consistent with Cook et al. (2002), who found that especially women and young people have an inclination to mistrust genetic modification of food. The lack of strong and highly significant associations between socio-demographics and fear of GMF suggests that this emotion occurs in all socio-economic layers of society and is a pervasive phenomenon (see also Frewer et al., 1997).

Table 3.4. Effects of socio-demographics on fear of GMF

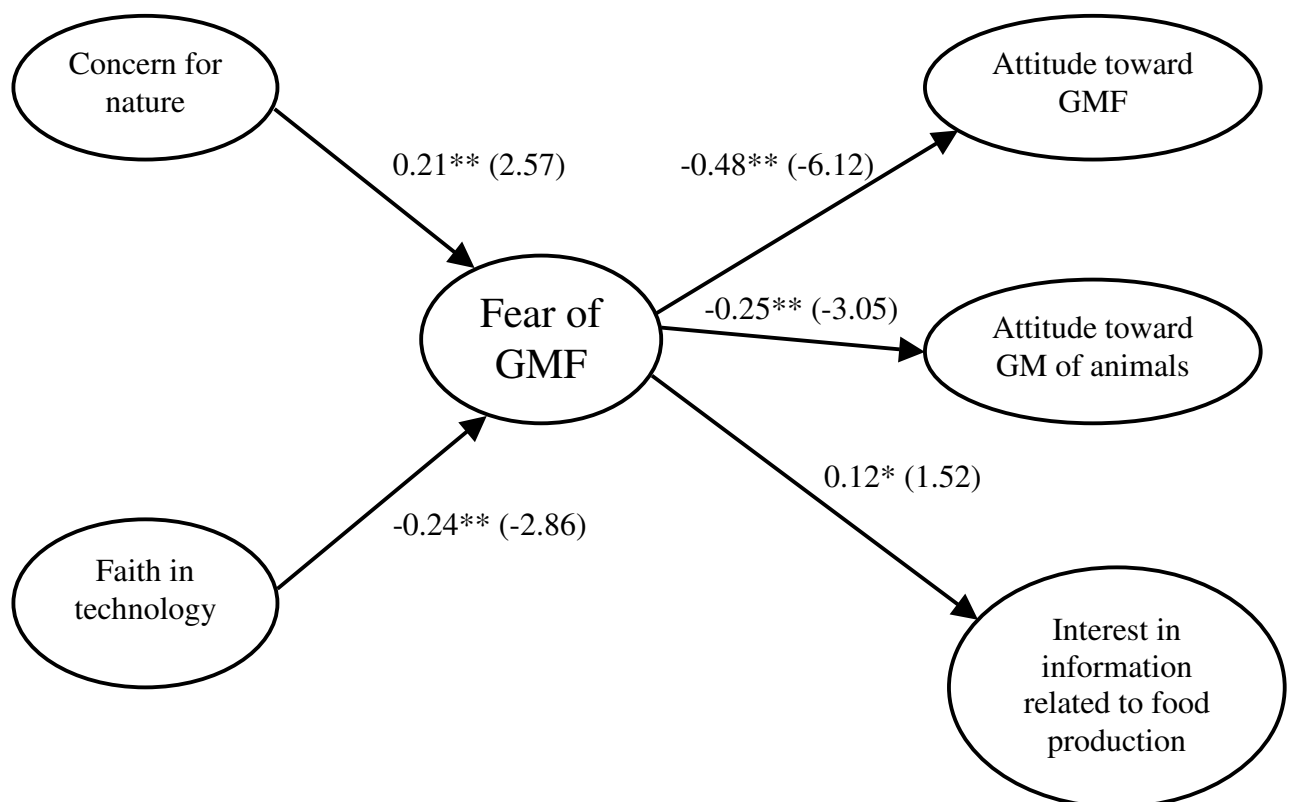
Socio-demographics	Standardized regression coefficients (t-value)	
Gender	-0.17	(-1.35)
Age	-0.20 *	(-1.76)
Household size	-0.04	(-0.37)
Education	-0.13	(-1.41)
Household income	-0.05	(-0.56)
Responsibility for daily grocery shopping	0.04	(0.31)
Main wage earner	-0.08	(-0.74)

* significant at $p < 0.10$

3.4 STUDY 3: ANTECEDENTS AND CONSEQUENCES OF FEAR OF GMF

The internal validity of the fear scale has been demonstrated in study 1. The high variance in fear emotions across consumers (table 3.3) indicates that consumers differ in their fear of GMF. Study 2 showed that socio-demographic factors cannot explain consumer differences in fear of GMF. In the third study, we will relate fear of GMF to some key *psychological* antecedents (concern for nature, faith in technology). Further, we will study some key consequences of fear of GMF (attitudes, information). Our conceptual framework is shown in figure 3.1.

Figure 3.1. Antecedents and consequences of fear of GMF



Note: Reported are completely standardized structural coefficients; t-values are given in parentheses

** significant at $p < 0.05$, one-sided

* significant at $p < 0.10$, one-sided

Two psychological antecedents that may play a major role in fear of GMF are concern for nature and the faith a consumer has in the technology used in food production. Bredahl (2001) found that the attitude toward nature had a positive effect on the perceived risk associated with GMF. Consumers who are concerned about naturalness of food products and production, regard gene technology in food production as unnatural and risky for nature (Verdurme and Viaene, 2003). We thus expect that consumers who are more concerned about nature and environmental aspects will experience more fear with respect to GMF. The attitude toward technology has a negative impact on the perceived risk associated with genetically modified food (Bredahl, 2001). As gene technology is the distinguishing feature of GMF, consumers that have more faith in the use of technology in food production are likely to be less fearful of GMF.

We will examine three consequences of fear of GMF: attitude toward GMF, attitude toward genetic modification of animals, and the interest in information concerning food production. The attitude toward GMF has been demonstrated to be of great influence on the intention to purchase the product (Bredahl, 2001), and is therefore an important aspect in any consumer model of GMF. Since fear is a negatively-valenced emotion, we expect that the level of fear has a negative impact on the attitude toward GMF. In addition, public concern is much focused on applications involving genetic modification of animals. We thus expect consumers who are fearful of GMF to have a negative attitude toward genetic modification of animals. The last factor included, is the interest of the consumer in information acquisition about food production. Fears regarding this new technology will stimulate the consumer to search for information in order to confirm or alleviate these fears (Isen, 1984). We thus expect a positive relation between fear and interest in information concerning food production.

3.4.1 Method

Data collection was discussed in study 2. Whenever possible we attempted to use measures that had been previously utilized in GMF research. Where a new scale had to be developed, we tried to use items that take into consideration all components of the construct. The measures appear in Measurement Appendix A.

The construct *concern for nature* was measured by means of an index that aggregated key facets pertaining to nature and environmentalism, including the own

health of the consumer, general environmental concerns, and animal welfare (Wandel and Bugge, 1997). We developed eight items, concerning the importance of organic products (reflecting own health by means of safe food), local and environmental production, and animal well-being, measured on a dichotomous scale. Responses on the eight items were aggregated to arrive at a single composite score. *Faith in technology* was measured by one item that assessed the attitude of subjects toward the growing influence of technology on food production, using a three-point scale. *Attitude towards GMF* and *attitude towards genetic modification of animals* were measured by single items, using six- and five-point scales, respectively, reflecting increasingly positive attitudes. *Interest in information about food* was measured by one item, asking the subjects how important several aspects related to production, ingredients, and genetic modification were to get information on. Measurement of fear was discussed in Study 1.

3.4.2 Results

The hypothesized model was tested using LISREL 8.50, with the covariance matrix as input. Because no conventional estimate of error was available for the single-item measures, we assumed no error in the measurement model for the antecedent and consequence constructs of fear. The assumption of no error provides a conservative test of the model.

Model fit was satisfactory: $\chi^2(43) = 114.70$ ($p < .001$), CFI = .90, TLI = .87. Figure 3.1 reports the standardized parameter estimates. The two antecedents, concern for nature ($\beta = .21$, $t = 2.57$) and faith in technology ($\beta = -.24$, $t = -2.86$) were significant and in the hypothesized direction. Consumers who were more concerned about nature are more fearful of GMF, whereas subjects who had faith in technology experienced less fear. Two of the consequences of fear of GMF are highly significant, the third marginally. Fear had significant negative effects on consumers' attitude toward GMF ($\beta = -.48$, $t = -6.12$) and on their attitude toward genetic modification of animals ($\beta = -.25$, $t = -3.05$). The effect of fear on the interest of information related to food production was in the expected direction but only marginally significant ($\beta = .12$, $t = 1.52$).

3.5 CONCLUSIONS

In this chapter we stringently validated a scale to measure the fear that consumers experience for GMF. Six emotion items (afraid, tense, panicky, worried, nervous, and scared) form together the unidimensional fear construct, and this fear scale was shown to be generalizable across different types of food. Furthermore, we demonstrated that GMF evoked significantly higher levels of fear than other types of foods and also more worry, over and above the fear GMF already generate. The data suggest a strong polarization in opinions, as reflected in the large variance in fear of GMF. Consumers, however, cannot be divided into socio-demographic segments based on the level of fear. Rather, fear of GMF is a phenomenon we see across all social strata.

The last study assessed the position of fear in a nomological net, including several antecedents and consequences. The feelings of fear were higher among people who are strongly concerned about nature, and lower for those consumers who have faith in technology in food production. These findings suggest that fear of GMF is a complex phenomenon that deals with general values concerning what is ethical in relation to nature and technology. Fear had a large impact on the attitude toward genetic modification of food and animals. This suggests that the inclusion of relevant emotions such as fear is necessary to more fully explain consumer attitudes toward contentious issues. Fear had a positive influence on interest in information concerning food production, suggesting that these consumers are more open for information. Recent studies indicate, however, that providing balanced information does not necessarily lead to a reduction in fear (Grunert et al., 2001; Scholderer and Frewer, 2003), since information acquisition may be directed to confirmation of fear rather than to alleviation of fear.

Our study has several limitations, which offer avenues for future research. Our study has validated a fear scale across several food types. Future research could test the scale in other contexts, involving other products and services, and to relate it to specific fear appeals. The scale can also be used in studies focused on fear-reducing strategies. We did not assess respondents' understanding of the different technologies (functional, genetic modification, organic). Although these terms are often used in a generic way, actual understanding of these technologies may differ across consumers. Future research could measure objective knowledge of the consumer, which could be

added as explanatory variable in models on fear of consumers for genetically modified food or other foods. In our study, consumers received additional explanation for functional foods. This may have biased the results in a “positive” direction (less fear, smaller variance). However, this did not materially affect the key conclusions, as the results were consistent with expectations and differences in latent means and variances with other groups were still significant.

Apart from the fear aroused by GMF and documented in this study, a key barrier to their acceptance by consumers is that “there is nothing in them for the consumer” (The Economist 2003, p. 77). However, recently GM technology has been used successfully to grow decaffeinated coffee beans, leading to a much better tasting product (Ogita et al., 2003). Future research could examine the tradeoffs between fears and benefits. Finally, this study should be replicated in other countries. GMF may evoke different fear intensities across countries and continents.

CHAPTER 4

THE IMPORTANCE OF PERCEIVED KNOWLEDGE TO DISTINGUISH CONSUMERS IN THEIR RELIANCE ON NET COGNITION OR NEGATIVE AND POSITIVE AFFECT FOR A RADICAL TECHNOLOGY

4.1 INTRODUCTION

Products manufactured by a radical technology often provide substantially larger consumer benefits than already existing products (Chandy and Tellis, 1998). Nonetheless, the new technology that is utilized, may create a feeling of crossing the "acceptable limit" for technologies among the general public (Goldenberg et al., 2001). Accordingly, not only the benefits and positive affect, but also risk and uncertainty (Ram, 1989) and negative emotions (Mick and Fournier, 1999; Veryzer, 1998) play a crucial role in the judgment of radical technologies.

Two well-known examples are nuclear energy and, more recently, genetic modification of food (Townsend et al., 2004). The advantages of nuclear energy are that the energy produced per amount of material consumed is the highest available and that there is no green house effect. The general public, nevertheless, is highly worried about reactor accidents and nuclear waste that can have severe consequences for humanity. The advantage of genetically modified food is that food products can be adapted in order to survive in arid areas and to resist harmful insects, but the general public is concerned about threats to human health and the environment.

In view of that, the products created with a radical technology can be associated with strong risks as well as strong benefits, and intense positive and negative emotions (Peters and Slovic, 2000). Furthermore, radical technologies are often accompanied by complex and conflicting information, making it very difficult for consumers to make a cognitive judgment (Peters and Slovic, 2000). Sometimes their affect is the only information consumers have. In this chapter, we will demonstrate that for a radical new technology consumers have the tendency to rely not only on the cognitive attributes of the technology but also on their feelings

associated with the technology. Next, we will provide evidence that whether a consumer relies on his cognition or affect does not only depend on the radical technology itself, but also on the characteristics of the consumer and the interaction between these two (Slovic et al., 2000).

We expect that consumers low on perceived knowledge rely relatively more on their emotions, because they observe a lack of information about the product (Pham, 1998; Edwards and Von Hippel, 1995). This chapter will focus specifically on the relevance of emotions with respect to radical technologies by exploring the role of perceived knowledge about this product category. Furthermore, we broaden the focus of the impact of cognition and affect beyond attitude and present a model that includes several behavioral and communicational responses that are relevant in the marketing context.

The contribution of this chapter is twofold. First, we develop a conceptual model with antecedents of the consumer's cognition and affect for a radical technology and the influence of cognition and affect on the consumer's responses to the radical technology. The three antecedents vary in terms of abstractness from consumer disposition to product-specific perception. The five responses will encompass the judgment, purchase intention and communication intention of consumers. Second, we include perceived knowledge of the radical technology in our model as a moderator. We hypothesize that this variable influences consumers' reliance on their cognition or affect to construct their judgment and behavioral responses. In addition, it influences the impact of the antecedents on the intensity of consumers' cognition and affect.

4.2 CONCEPTUAL FRAMEWORK

4.2.1 Negative and positive affect vs. Net cognition

Affect pertains to the sensations, feelings and emotions that one experiences in response to an attitude object (Dubé et al, 2003). The most often encountered emotion dimensions in both the marketing and psychology literature are negative and positive affect (chapter 2 of this dissertation). These dimensions are largely independent, which indicates that consumers consider their negative and positive affect separately. For example, more negative affect does not automatically result in less positive affect.

The cognition of a consumer contains the positive and negative attributes and beliefs about the target (Dubé et al, 2003). These risks and benefits are strongly inversely related (Alhakami and Slovic, 1994). This means that, in contrast to their affect, consumers cannot see the risks and benefits of a radical technology separately. We will therefore use the term net cognition, which includes both lower risks and higher benefits.

Negative and positive affect allow consumers to make a quick, easy and efficient decision compared to an elaborate evaluation of the pros and cons (Slovic et al., 2002). For the complex radical technologies it therefore seems a lot easier to make a decision based on negative and positive affect rather than net cognition, especially if one perceives his knowledge to be limited.

In our conceptual framework we assume that negative and positive affect as well as net cognition are independent factors that influence a consumer's attitude and his other responses (Zajonc, 1980b, see also Dubé et al., 2003). In addition, we assume that the relation between negative and positive affect on the one side and net cognition on the other side is not dichotomous in the sense that a consumer either relies on his negative and positive affect or on his net cognition, but rather on a combination with varying levels of cognition and affect (Edwards and Von Hippel, 1995). This is intuitively appealing as consumers that rely on their negative and positive affect can still take into account some of their beliefs and vice versa. Pure forms of affect-based and cognition-based attitudes exist, yet are beyond the scope of this study.

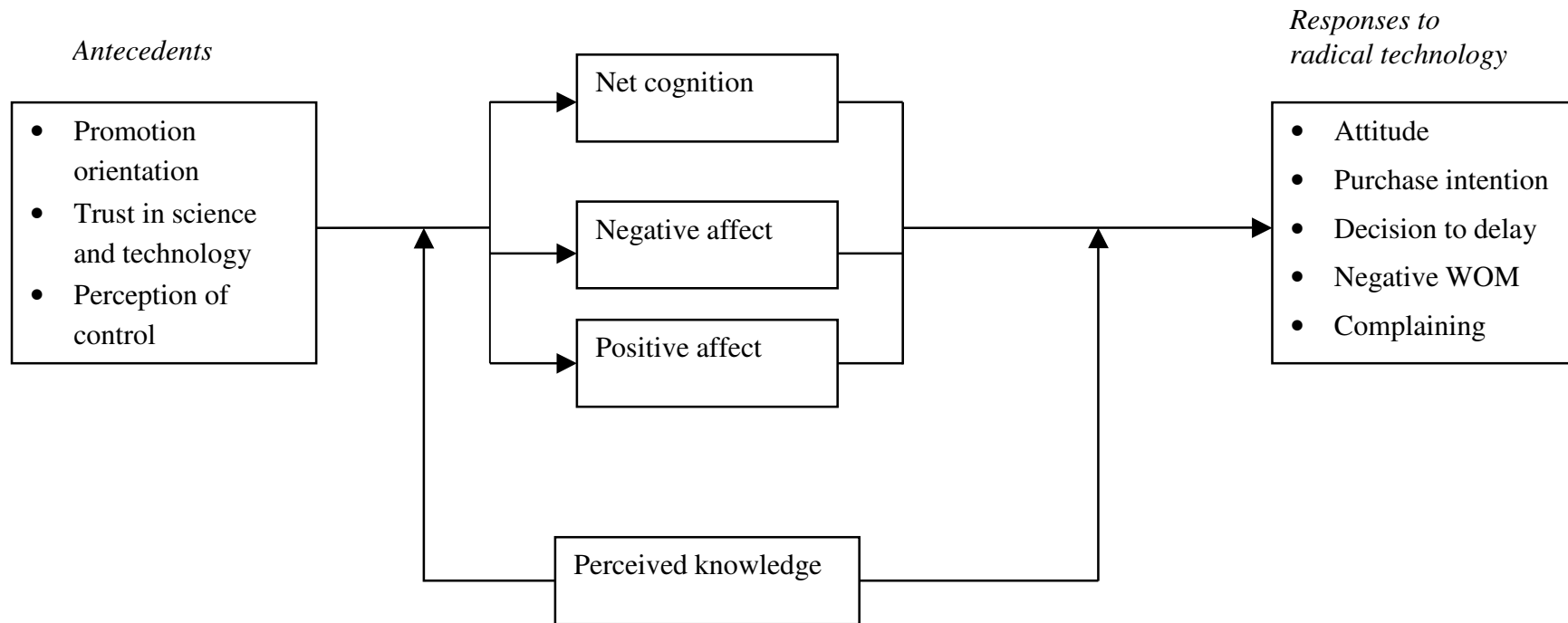
It is important to distinguish between consumers that depend more on their negative and positive affect as opposed to those that depend on their net cognition, as this allows for more effective communication to consumers about radical new technologies (Drolet and Aaker, 2002). These technologies often meet with fierce opposition from the general public who deem the new technology too risky (Slovic, 1987). As a consequence many products produced by radical new technologies fail on the market (Goldenberg et al., 2001). It is therefore vital to know how consumers construct their evaluation and arrive at, for example, the decision to communicate in a negative way to others. More importantly, it is crucial to know how consumers differ from each other in this process.

4.2.2 Perceived knowledge

In order to know whether a consumer relies more on his net cognition or on negative and positive affect, it is essential to know how much knowledge consumers perceive to have about the radical technology. Perceived knowledge concerns the amount of knowledge consumers believe they have about the radical technology (Smith and Park, 1992), as opposed to objective knowledge that refers to accurate stored information (e.g., Bettman and Park, 1980). Perceived knowledge is a crucial construct for the acceptance of radical technologies (e.g., Shaw, 2002). In addition, perceived knowledge influences whether consumers rely on their net cognition or negative and positive affect, because it has an impact on the information search and the use of decision heuristics (e.g., Alba and Hutchinson, 1987), like “How-do-I-feel-about-it” (Schwarz and Clore, 1988). Pham (1998) has shown that consumers rely on their affect when they consider their feelings as representative of the target. In other words, we rely on our negative and positive affect, especially when relevant information is perceived to be lacking (Edwards and Von Hippel, 1995; Pham, 1998).

Therefore, we posit that consumers that have low perceived knowledge about the radical technology will pay more attention to their negative and positive affect, and consumers with high perceived knowledge more to their net cognition. This is reflected in our conceptual framework where perceived knowledge acts as a moderator between net cognition, negative affect and positive affect and their influence on several consumer responses to the radical technology (see figure 4.1). Furthermore, we expect that perceived knowledge also influences the relation between the antecedents and their influence on the intensity of net cognition, negative affect and positive affect. Next we will discuss our research hypotheses.

Figure 4.1. Conceptual framework



4.3 RESEARCH HYPOTHESES

4.3.1 Antecedents of net cognition, negative affect, and positive affect for radical technologies

Based on previous research we include three antecedents of the intensity of net cognition, negative affect and positive affect. The first is promotion orientation. This is a general consumer disposition where consumers can be distinguished in their focus on benefits. Benefits are especially important for a radical technology (e.g., Lusk, et al., 2004a). The second is trust in science and technology. This is also a general consumer disposition, but it is specifically relevant in the context of radical technologies (Bredahl, 2001; Traill et al., 2004). The third is the perception of control. This antecedent can only be experienced in direct relation to the radical technology (Barling et al., 1999; Subrahmanyam and Cheng, 2000). These antecedents thus reflect a variation in abstractness from general consumer disposition to product-specific perception.

Promotion orientation. Although promotion goals can be temporarily enhanced or reduced, there are also ongoing individual differences in the extent to which individuals are promotion oriented (Higgins, 1997). Individuals with promotion goals are concerned with achieving their hopes, wishes, and aspirations (e.g., Higgins et al., 1997). Consumers with a strong promotion orientation have a different way of processing than consumers with a weak promotion orientation. The first are more likely to seek information about the promotion attributes, i.e., the benefits of a product, and they are sensitive to the presence or absence of positive outcomes (Higgins, 1999). This means that consumers with a strong promotion orientation will concentrate on the net cognition associated with the radical technology. As a consequence these consumers will have more intense net cognition than consumers with a weak promotion orientation. Due to their focus on information and product attributes, we expect that the promotion orientation of consumers has no impact on their negative and positive affect. Consequently, we hypothesize the following:

H1a: Promotion orientation has a positive influence on the net cognition associated with the radical technology.

H1b: Promotion orientation has no effect on the negative affect associated with the

radical technology.

H1c: Promotion orientation has no effect on the positive affect associated with the radical technology.

Trust in science and technology is a socio-political factor that reflects the belief of consumers that science and technology can solve society's problems (Steger et al., 1989). The trust in science and technology has an important influence on the evaluation of radical technologies (e.g., Frewer et al., 2004). We expect that consumers who have more trust in science and technology more readily accept radical technologies. Consumers with more trust in science and technology will evaluate a radical technology more positively. In addition, when they put more faith in this technology their negative feelings will be reduced and their positive feelings increased. We therefore hypothesize that consumers that have high trust in science and technology will have more intense net cognition, less intense negative affect and more intense positive affect than consumers that have low trust in science and technology. Hence we propose:

H2a: Trust in science and technology has a positive influence on the net cognition associated with the radical technology.

H2b: Trust in science and technology has a negative influence on the negative affect associated with the radical technology.

H2c: Trust in science and technology has a positive influence on the positive affect associated with the radical technology.

Perception of control reflects the control a consumer thinks he has over whether he can purchase or avoid purchasing a product manufactured by a radical technology (e.g., Cook et al., 2002). This is related to the labeling of products manufactured with a radical technology and the transparency of the food chain (Barling et al., 1999). Both opposing and approving consumers like to be informed and to make their own choices (Subrahmanyam and Cheng, 2000). When consumers have a higher perception of control with regard to the products produced by the radical technology, this results in a more positive evaluation of the product, and more positive and less negative feelings. The underlying reason is that consumers that are anxious to avoid the product produced by a radical technology know that the product

is no threat to them because they can avoid it. Also, consumers that would like to purchase the product know that they can find it. We thus posit that consumers with a higher perception of control experience more intense net cognition and positive affect, and less negative affect.

H3a: Perception of control related to the radical technology has a positive influence on the net cognition associated with the radical technology.

H3b: Perception of control related to the radical technology has a negative influence on the negative affect associated with the radical technology.

H3c: Perception of control related to the radical technology has a positive influence on the positive affect associated with the radical technology.

Covariates. In this study, we focus on the influence of consumer characteristics on the intensity of net cognition and negative and positive affect consumers experience when they think about a radical technology. Three key socio-demographics are included in our framework as covariates: gender, age and education.

4.3.2 Consequences of net cognition, negative affect and positive affect for radical technologies

In our study we focus on the attitude of consumers and three behavioral responses that are frequently encountered in the marketing literature: purchase intention, extent of word-of-mouth (WOM) and likelihood of complaining. Furthermore, we include another behavior – delaying the decision – which is a frequently used strategy to cope with radical technologies (Mick and Fournier, 1998). This means that the judgments as well as behavioral and communicational intentions of consumers with respect to the radical technology are represented in this study.

Attitude is the psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor (Eagly and Chaiken, 1993). Previous research has shown that both net cognition and negative and positive affect influence a person's attitude directly (Finucane et al., 2000).

Purchase intention represents the person's motivation in the sense of his or her conscious plan to exert effort to carry out a behavior (Fishbein and Ajzen, 1975). Most theories assume that the variation of purchase intention is completely explained by the attitude of a person, but Bodur et al. (2000) have, for example, shown that

negative and positive affect influence purchase intention over and above the effect of attitude. We therefore include purchase intention as a consequence of net cognition and negative and positive affect, while controlling for the influence of attitude.

Deciding to delay means that the consumer waits and postpones the decision-making until additional information clarifies the uncertainty surrounding the radical technology (Carver et al., 1989; Lipshitz and Strauss, 1997). It is possible that a consumer will buy the product at a later point in time, but at this moment the consumer is highly uncertain about what to do (Mick and Fournier, 1998). Deciding to delay is an active coping strategy in the sense that the consumer is adapting his behavior to deal effectively with the radical technology, but it is also a passive strategy in the sense that it actually means not acting (Carver et al., 1989).

Negative WOM covers all negative communications of consumers with the members of their social and professional network (Anderson, 1998). These negative communications can be expressed by talking or e-mailing to family members, friends, relatives, colleagues, and so forth (Zeelenberg and Pieters, 2004). Negative WOM is a form of coping behavior in that it allows consumers to better deal with the radical technology by serving as a ventilation of the consumer's feelings and by advising others (Carver et al., 1989). But it can have a great impact on the market performance of the respective product. Due to the uncertainty surrounding the radical technology, consumers search for information about the radical innovation from their near peers and are in this way very susceptible for negative information about the radical innovation (Rogers, 2003).

Complaining occurs when customers communicate their discontent explicitly to the firm or to a third party, such as a consumer union or a governmental body (Zeelenberg and Pieters, 2004). Complaining is more formal and to an organization rather than person compared to negative WOM. Yet its venting function is similar to that of negative WOM. It will feel namely really good to complain to the organization that is to blame for bringing the products produced by the radical technology to the market.

How consumers evaluate and feel about a radical technology has an impact on their responses (Frewer et al., 2004). Net cognition, negative affect and positive affect will therefore have an important influence on how consumers react to products created by a radical technology. To be more precise, we hypothesize that net cognition has a positive influence on favorable responses and a negative influence on

unfavorable responses (Lusk et al., 2004b). Negative affect has a negative influence on favorable responses and a positive influence on unfavorable responses (Townsend and Campbell, 2004). Positive affect has a positive influence on favorable responses and a negative influence on unfavorable responses (Townsend and Campbell, 2004). Hence:

H4: Net cognition associated with the radical technology has a positive influence on the consumers' positive attitude (H4a) and purchase intention (H4b), and a negative influence on the decision to delay (H4c), negative WOM (H4d) and complaining (H4e).

H5: Negative affect associated with the radical technology has a negative influence on the consumers' positive attitude (H5a) and purchase intention (H5b), and a positive influence on the decision to delay (H5c), negative WOM (H5d) and complaining (H5e).

H6: Positive affect associated with the radical technology has a positive influence on the consumers' positive attitude (H6a) and purchase intention (H6b), and a negative influence on the decision to delay (H6c), negative WOM (H6d) and complaining (H6e).

H7: A positive attitude has a positive influence on purchase intention.

4.3.3 Moderating effect of perceived knowledge

Promotion orientation. Consumers with a stronger promotion orientation will focus more on their net cognition. For consumers with high perceived knowledge of the radical technology this will make no difference, since these consumers already focus on their cognition. Hence, we predict that for these consumers a ceiling effect will occur. Consumers low on perceived knowledge about the radical technology, however, are expected to focus mainly on their negative and positive affect. We therefore predict that low perceived knowledge consumers with a strong promotion focus will also seek information about the benefits. Consumers low on perceived knowledge have more intense net cognition when they have a strong promotion orientation than if they have a weak promotion orientation. No differing effects are expected for negative and positive affect. Thus, we posit:

H8a: The positive relation between promotion orientation and net cognition will be

weaker when perceived knowledge is high.

H8b: Perceived knowledge has no influence on the relation between promotion orientation and negative affect.

H8b: Perceived knowledge has no influence on the relation between promotion orientation and positive affect.

Trust in science and technology. When consumers have high perceived knowledge about the radical technology this will strengthen the positive relation between trust in science and net cognition. Consumers that have both high trust in science and technology and understand what the radical technology is about will attach more benefits and less risk to this radical technology than consumers that do not understand the radical technology. Consumers with high perceived knowledge focus more on their cognitions, hence we expect no differences in the relations between trust in science and technology and negative and positive affect for consumers with different levels of perceived knowledge. We therefore propose the following hypotheses:

H9a: The positive relation between trust in science and technology and net cognition will be stronger when perceived knowledge is high.

H9b: Perceived knowledge has no influence on the relation between trust in science and technology and negative affect.

H9c: Perceived knowledge has no influence on the relation between trust in science and technology and positive affect.

Perception of control. Consumers high on perceived knowledge have stronger beliefs about the radical technology, because they understand it better than consumers low on perceived knowledge. When they also believe that they have the ability to identify products manufactured with the radical technology, consumers with high perceived knowledge will relate more benefits and fewer risks to the radical technology than consumers with low perceived knowledge. We expect no differences in the relations between perception of control and negative and positive affect for consumers with different levels of perceived knowledge. Thus we posit:

H10a: The positive relation between perception of control and net cognition will be

stronger when perceived knowledge is high.

H10b: Perceived knowledge has no influence on the relation between perception of control and negative affect.

H10c: Perceived knowledge has no influence on the relation between perception of control and positive affect.

Consequences of net cognition, negative affect and positive affect for products created with radical technologies. Consumers that think they know about the radical technology will base their response on their beliefs, and consumers that feel unknowledgeable rely on their feelings. Thus, for consumers low (high) on perceived knowledge their negative and positive affect (net cognition) influences their responses stronger than for consumers high (low) on perceived knowledge. Therefore we propose the following hypotheses:

H11: The positive relation between net cognition and the consumers' response will be stronger when perceived knowledge is high.

H12: The negative relation between negative affect and the consumers' response will be weaker when perceived knowledge is high.

H13: The positive relation between positive affect and the consumers' response will be weaker when perceived knowledge is high.

4.4 METHOD

4.4.1 Stimulus

In this chapter we focus on a particular type of radical technology, namely gene technology, and in particular on its application to food: genetically modified food (GMF) products. GMF elicits widely diverse and opposing reactions (Smits, 2002; Wales and Mythen, 2002; Fricker, 2002), as it is supported by some, but refused by many others (Grunert, 2002). In addition, GMF has been successfully connected to the elicitation of both affect (chapter 2 of this dissertation) – especially fear (chapter 3 of this dissertation) – and beliefs (Bredahl, 2001). Recent headlines reflecting net cognition and negative affect are for example “The end for GM crops: Final British trial confirms *threat* to wildlife” (Independent, 2005), “Genetically

modified rice in China *benefits* farmers' *health*, study finds" (Medical News Today, 2005) and "GM *fear* as human liver gene is put into rice" (Daily Telegraph, 2005).

4.4.2 Sample and procedure

Data were collected in a nationally representative sample among 443 Dutch consumers using a questionnaire. CentERdata, a survey research institute affiliated with the Faculty of Economics and Business Administration at Tilburg University, carried out the data collection. CentERdata is specialized in Internet-based surveys, and carries this out through a telepanel, the CentERpanel. This panel consists of households in the Netherlands that fill out a questionnaire on the Internet every week. The CentERpanel is representative of the Dutch population. As such the socio-demographics of all participants were known in advance. The sample we used consisted of 53.5% men, the average age was 48 years and ranged between 16 and 84 with a fairly normal spread.

The collection of the data was executed in two waves. On wave 1, measures were taken of the general consumer characteristics: promotion orientation and trust in science and technology. In wave 2, one week later, measures were obtained on the GMF-related measures: net cognition, negative affect, positive affect, perception of knowledge, attitude toward GMF, purchase intention, decision to delay, negative WOM, complaining, and perception of control concerning GMF.

4.4.3 Division in groups

To create the two perceived knowledge groups we conducted a median split among the total sample of respondents based on their perception of knowledge. The group of consumers with low perceived knowledge consists of 253 consumers with an average of 1.46¹ (standard deviation of .41), and the group of consumers with high perceived knowledge contains 190 consumers with an average of 2.95 (standard deviation of .58).

Table 4.1 shows the profile of the two knowledge groups. ANOVA was used to test to what extent consumers low vs. high on perceived knowledge differ on several socio-demographics and other relevant variables.

¹ Perception of knowledge is measured on a five-point scale, where 1 represents low and 5 high knowledge.

Table 4.1. Profile of consumers low and high on perceived knowledge

	Low perceived knowledge		High perceived knowledge		F(1,441)
	Mean	Standard deviation	Mean	Standard deviation	
<i>Socio-demographics</i>					
Gender (Male)	48%		61%		7.63** ($\chi^2(1)$)
Education (low; middle; high, resp.)	31%; 32%; 38%		31%; 31%; 39%		.10 ($\chi^2(1)$)
Age	50	16	48	17	1.11
Social class (1 = high; 5 = low)	2.48	1.01	2.30	1.04	3.09*
Number of children	.87	1.18	.88	1.14	.01
Size of community (1 = large; 5 = small)	2.93	1.22	2.97	1.39	.13
Net income (Euro)	1335.49	1081.67	1520.56	2026.93	1.51
<i>Use of information sources</i> (1 = never; 5 = always)					
Friends	2.03	.97	2.14	.94	1.31
Website of companies	2.00	1.05	2.27	1.12	6.93**
Consumer union	2.37	1.28	2.61	1.24	3.71**
Scientific journals	2.00	1.14	2.57	1.21	26.64**
Media	2.64	1.15	2.95	1.12	8.15**
Package	2.77	1.28	3.01	1.24	3.09**
<i>Food-related characteristics</i> (1 = disagree; 5 = agree)					
Perceived importance of food	3.41	.74	3.61	.77	7.90**
Decisions about health risks should be left to experts	3.62	.92	3.45	1.05	3.06*
I do not have to worry about public concerns, because I cannot do anything about it	2.64	1.02	2.44	1.00	4.15**
I check whether foods contain additives	2.28	1.05	2.35	1.06	.45
I check whether foods are produced with pesticides	2.39	1.12	2.47	1.08	.58

** p < .05 * p < .10

The results show that a larger number of men belong to the group with high perceived knowledge than low perceived knowledge ($\chi^2(1) = 7.63, p < .01$). For level of education and age no differences were found between low and high knowledge ($\chi^2(1) = .10, n.s.$; $F(1,441) = 1.11, n.s.$, resp.). Consumers with high perceived knowledge belong to a slightly higher social class than consumers with low perceived knowledge ($F(1,441) = 3.09, p < .10$). Furthermore, the results indicated no differences in the number of children, size of the community, and net income of respondents of the two groups.

When comparing the reliance on different sources that could provide information about the radical technology, it becomes clear that consumers high on perceived knowledge use more information in general. There is no difference for the reliance on friends ($F(1,441) = 1.31, n.s.$), but consumers with high perceived knowledge would utilize more often websites of companies ($F(1,441) = 6.93, p < .05$), the consumer union ($F(1,441) = 3.71, p < .05$), scientific journals ($F(1,441) = 26.64, p < .05$), the media ($F(1,441) = 8.15, p < .05$), and product packages ($F(1,441) = 3.09, p < .05$).

In addition, consumers with a higher perception of knowledge find food more important than consumers with a lower perception of knowledge ($F(1,441) = 7.90, p < .05$). Also consumers that perceive to know less about GMF are rather passive in issues related to societal risks, as they believe that decisions about health risks should be made by experts ($F(1,441) = 3.06, p < .10$), and that they cannot do anything about public concerns ($F(1,441) = 4.15, p < .05$). No differences were found concerning the importance of additives ($F(1,441) = .45, n.s.$) and pesticides ($F(1,441) = .58, n.s.$) in food products.

4.4.4 Measures

Unless noted otherwise all items are measured on a five-point Likert scale ranging from “I completely disagree” (=1) to “I completely agree” (=5). Measurement appendix B documents the overview of the items used.

Net cognition. Fifteen items that reflect the diversity of benefits and risks associated with GMFs measured the net cognition of consumers. The beliefs include environmental risks (Mucci and Hough, 2003), personal risks (Miles and Frewer, 2001), societal benefits (Saba and Vassallo, 2002), environmental benefits (Saba and Vassallo, 2002), and personal benefits (Mucci and Hough, 2003). The Cronbach's

Alpha for these fifteen items was .84. Note that we recoded the negative items.

Negative affect. Respondents were asked to indicate to what extent they experience twelve negative emotions when thinking about genetically modified food. These emotion items have been shown to be relevant for GMF in chapter 2 of this dissertation. Emotions were rated on a five-point Likert scale ranging from “I feel this emotion not at all” (=1) to “I feel this emotion very strongly” (=5). The Cronbach’s Alpha for negative affect was .93.

Positive affect. Respondents were asked to indicate to what extent they experience eight positive emotions when thinking about genetically modified food (chapter 2 of this dissertation), and rated on a five-point Likert scale ranging from “I feel this emotion not at all” (=1) to “I feel this emotion very strongly” (=5). The Cronbach’s Alpha for positive affect was .89.

Perception of knowledge. Perceived knowledge of GMF was based on the measure used by Smith and Park (1992), and included three items. The Cronbach’s Alpha for these three items was .78.

Promotion orientation. Lockwood et al. (2002) developed and tested the Promotion Scale. This scale covers the extent to which consumers endorse items relevant to promotion goals. We retained five items of this scale, which resulted in a Cronbach’s Alpha of .73.

Trust in science and technology. Trust in science and technology was based on the scale by Steger et al. (1989) and consists of four items with a Cronbach’s Alpha of .62.

Perception of control. The perception of control was operationalized with four items based on Cook et al. (2002). Consumers had to state to what extent they have the feeling that they can choose vs. avoid genetically modified food products (e.g., a genetically modified tomato) and food products with genetically modified ingredients (e.g., pasta sauce with genetically modified tomatoes). The Cronbach’s Alpha for these items was .94.

Attitude. Attitude toward GMF was measured by three items and based on Bredahl (2001). The Cronbach’s Alpha for these three items was .93.

Purchase intention. The intention to buy GMF was measured on a seven-point response scale ranging from “I will most certainly not buy a GMF” (=1) to “I will most certainly buy a GMF” (=7) and based on Cook et al. (2002).

Decision to delay. The three items for the construct decision to delay were

based on the theories on delay by Folkman and Lazarus (1985), Lipshitz and Strauss (1997), and Mick and Fournier (1998). The Cronbach's Alpha for these three items was .75.

Negative word-of-mouth. The three items measuring negative word of mouth were adapted from the scales by Zeelenberg and Pieters (2004) and Zeithaml et al. (1996). The Cronbach's Alpha for these three items was .65.

Complaining. The three items measuring negative word of mouth were adapted from the scales by Zeelenberg and Pieters (2004) and Folkman and Lazarus (1985). The Cronbach's Alpha for these three items was .88.

Socio-demographics. The level of education was measured with three levels, ranging from low (secondary education) to high (university level).

4.5 RESULTS

4.5.1 Measurement validation

Before testing our hypotheses, the measures were validated using confirmatory factor analysis (CFA). These analyses were performed on the covariance matrix (matrices) using LISREL 8.54. The following fit measures were obtained: $\chi^2(1665) = 5037.57$ ($p < .001$), Root Mean Square Error of Approximation (RSMEA) = .07, Tucker-Lewis Index (TLI) = .94, Comparative Fit Measure (CFI) = .94. Although the chi-square value was highly significant (not unexpected given the large sample size; Anderson and Gerbing, 1988), other indicators suggest a good model fit. The RSMEA is below .08, and TLI and CFI are both above the frequently used cutoff of .90. All factor loadings were significant at $p < .01$, and 80% of the standardized factor loadings were above .50, with an average factor loading of .67. All factor correlations between constructs were significantly below unity ($p < .001$). In sum, convergent and discriminant validity between the constructs is supported (Anderson and Gerbing, 1988).

Cross-group measurement validation

Next the measures for the two knowledge groups were validated. To do this configural and metric invariance were tested using multigroup CFA (Steenkamp and Baumgartner, 1998). Configural invariance was supported as the CFA model fit was

good: $\chi^2(3330) = 6829.41$ ($p < .001$), RSMEA = .07, TLI = .92, CFI = .93. All factor loadings were significant at $p < .01$, and 79% of the (within-group standardized) factor loadings were above .50, with an average factor loading of .66. All factor correlations were significantly below unity ($p < .001$), supporting convergent and discriminant validity between the constructs (Anderson and Gerbing, 1988). By constraining the matrix of factor loadings to be invariant across low and high perceived knowledge (metric invariance), the equality of factor loadings was also supported: $\chi^2(3380) = 7019.59$ ($p < .001$), RSMEA = .07, TLI = .92, CFI = .93.

Accordingly, metric invariance of the measures was supported. The good model fit and the significant factor loadings further support the unidimensionality and convergent validity of the constructs (Anderson and Gerbing, 1988). Items were averaged for each scale to obtain composite scores for the various constructs. Mean values of key constructs are provided in table 4.2. Given that metric invariance is established, we can now validly estimate the structural relations between the constructs and test the hypotheses in a multiple group setting (Steenkamp and Baumgartner, 1998).

4.5.2 Descriptives

Before testing the proposed model, ANOVA tests have been carried out to indicate to what extent consumers with low vs. high perceived knowledge differ on the variables of our conceptual model. Table 4.2 provides the means and standard deviations for these variables as a function of perceived knowledge.

For the three antecedents – promotion orientation, trust in science and technology, and perception of control – no differences were found ($F(1,441) = .35$, n.s.; $F(1,441) = 1.80$, n.s.; and $F(1,441) = 1.71$, n.s., resp.).

There was no difference in the intensity of net cognition between the two groups ($F(1,441) = .70$, n.s.), but consumers with low perceived knowledge experience both less intense negative affect and less intense positive affect than consumers with high perceived knowledge ($F(1,441) = 7.74$, $p < .01$, resp. $F(1,441) = 6.66$, $p < .01$). This suggests that high perceived knowledge consumers are more extreme in their feelings than low perceived knowledge consumers.

Table 4.2. Differences in key variables for consumers low and high in perceived knowledge

	Low perceived knowledge		High perceived knowledge		F(1,441)
	Mean	Standard deviation	Mean	Standard deviation	
<i>Antecedents</i>					
Promotion orientation	3.40	.55	3.43	.57	.35
Trust in science and technology	3.54	.59	3.62	.62	1.80
Perception of control	2.38	1.09	2.51	.97	1.71
<i>Cognition and affect</i>					
Net cognition	2.83	.42	2.79	.59	.70
Negative affect	1.84	.74	2.07	.89	7.74**
Positive affect	1.66	.66	1.87	.80	6.66**
<i>Responses</i>					
Attitude	2.72	.68	2.62	.96	1.35
Purchase intention	3.53	1.15	3.42	1.79	.62
Delay	3.77	.70	3.39	1.02	22.47**
Negative WOM	2.95	.82	3.21	.85	11.06**
Complaining	1.87	.74	2.04	.90	4.50**

** p < .05 * p < .10

No differences were found with respect to attitude and purchase intention, but for the other responses significant differences were revealed. Consumers with low perceived knowledge have a higher intention to delay the decision to purchase GMF ($F(1,441) = 22.47$, $p < .01$), but have a lower inclination to communicate negatively about GMF, because they have a lower score on negative WOM ($F(1,441) = 11.06$, $p < .01$) and on complaining ($F(1,441) = 4.50$, $p < .01$) than consumers with high perceived knowledge.

4.5.3 Hypotheses testing

Structural equation modeling was used to test the hypotheses. Due to the relatively small sample size for the two groups (253 and 190 respondents) and the large number of items (64 in total) we measured each latent variable by a single indicator variable. This single indicator variable is called a “data parcel” and is constructed by taking the mean of the items for each scale and fixing the error variance at a level appropriate to its coefficient alpha reliability (Anderson and Gerbing, 1988). Using data parceling results in less biased estimates of structural parameters and better fitting solutions, when items have a unidimensional structure

(Bandalos, 2002; Little et al., 2002; see Steenkamp et al., 2003 for similar practice). The paths between the single indicators and latent variables were set to one so that the variance of the latent constructs could be freely estimated. The model with all 443 respondents had a good fit: $\chi^2(39) = 109.19$ ($p < .001$), RSMEA = .06, TLI = .94, CFI = .97.

4.5.4 Main effects

The unstandardized parameter estimates and t-values for the model with main effects are included in table 4.3.

H1a proposes a positive association between promotion orientation and net cognition, but this relationship was nonsignificant ($\gamma = .03$, $t = .65$). Hence H1a is rejected. In line with our expectations (H1b and H1c), promotion orientation has no influence on negative affect ($\gamma = -.02$, $t = -.20$) and positive affect ($\gamma = -.01$, $t = -.15$). Consistent with H2a, the trust in science and technology was found to be positively associated with net cognition ($\gamma = .23$, $t = 4.08$). H2b posits a negative relation between trust in science and technology with negative affect. This hypothesis is supported ($\gamma = -.25$, $t = 2.62$). The relationship between trust in science and technology and positive affect was found to be positive and significant ($\gamma = .25$, $t = 2.95$). H2c is therefore supported. As hypothesized (H3a, H3b, and H3c), the consumer's perception of control has a positive relation with his net cognition ($\gamma = .09$, $t = 3.98$), a negative association with his negative affect ($\gamma = -.13$, $t = -3.60$), and a positive relation with his positive affect ($\gamma = .14$, $t = 4.12$). H3a, H3b, and H3c are therefore supported.

Consistent with our expectations (H4a and H4b), net cognition has a positive association with the consumer's attitude ($\beta = 1.15$, $t = 12.21$) and purchase intention ($\beta = 1.00$, $t = 4.03$). H4c posits a negative relationship between net cognition and the decision to delay. This hypothesis is supported ($\beta = -.33$, $t = -2.43$). Contrary to our expectations (H4d), the negative relationship between net cognition and negative WOM is insignificant ($\beta = -.19$, $t = -1.38$). In line with H4e, there is a negative association between net cognition and complaining ($\beta = -.34$, $t = -2.79$).

Table 4.3. Model with main effects (unstandardized results with t-values)

	Relation	Expected direction	Unstandardized coefficient	t-value	Hypothesis accepted?
H1a	Promotion orientation → Net cognition	+	.03	.65	No
H1b	Promotion orientation → Negative affect	0	-.02	-.20	Yes
H1c	Promotion orientation → Positive affect	0	-.01	-.15	Yes
H2a	Trust in science and technology → Net cognition	+	.23	4.08**	Yes
H2b	Trust in science and technology → Negative affect	-	-.25	-2.62**	Yes
H2c	Trust in science and technology → Positive affect	+	.25	2.95**	Yes
H3a	Perception of control → Net cognition	+	.09	3.98**	Yes
H3b	Perception of control → Negative affect	-	-.13	-3.60**	Yes
H3c	Perception of control → Positive affect	+	.14	4.12**	Yes
H4a	Net cognition → Attitude	+	1.15	12.21**	Yes
H4b	Net cognition → Purchase intention	+	1.00	4.03**	Yes
H4c	Net cognition → Delay	-	-.33	-2.43**	Yes
H4d	Net cognition → Negative WOM	-	-.19	-1.38	No
H4e	Net cognition → Complaining	-	-.34	-2.79**	Yes
H5a	Negative affect → Attitude	-	-.16	-3.74**	Yes
H5b	Negative affect → Purchase intention	-	-.32	-4.34**	Yes
H5c	Negative affect → Delay	+	.32	5.10**	Yes
H5d	Negative affect → Negative WOM	+	.23	3.55**	Yes
H5e	Negative affect → Complaining	+	.37	6.48**	Yes
H6a	Positive affect → Attitude	+	.20	4.21**	Yes
H6b	Positive affect → Purchase intention	+	.24	2.89**	Yes
H6c	Positive affect → Delay	-	-.10	-1.43	No
H6d	Positive affect → Negative WOM	-	-.42	-5.71**	Yes
H6e	Positive affect → Complaining	-	-.15	-2.29**	Yes
H7	Attitude → Purchase intention	+	.67	4.78**	Yes
	Gender (male) → Positive affect		.18	2.58**	
	Age → Negative affect		.05	2.12**	
	Level of education → Negative affect		-.15	-2.59**	

** p < .05; * p < .10

Negative affect has a negative relation with attitude ($\beta = -.16$, $t = -3.74$) and purchase intention ($\beta = -.32$, $t = -4.34$). Hence H5a and H5b are supported. We hypothesized a positive relation between negative affect and the decision to delay (H5c), negative WOM (H5d), and complaining (H5e). The results support these hypotheses ($\beta = .32$, $t = 5.10$; $\beta = .23$, $t = 3.55$; and $\beta = .37$, $t = 6.48$, resp.).

Consistent with H6a and H6b, positive affect has a positive relation with attitude ($\beta = .20$, $t = 4.21$) and purchase intention ($\beta = .24$, $t = 2.89$). We hypothesized a negative association between positive affect and the decision to delay (H6c), but this relationship is not significant ($\beta = -.10$, $t = -1.43$). Hence H6c is rejected. The relationships between positive affect and negative WOM (H6d) and complaining (H6e) were found to be negative and significant ($\beta = -.42$, $t = -5.71$ and $\beta = -.15$, $t = -2.29$, resp.). As a result hypotheses H6d and H6e are supported.

H7 posits a positive association between the attitude and purchase intention of consumers. This hypothesis is supported ($\beta = .67$, $t = 4.78$).

In addition to our hypotheses we found three significant relations with the included covariates. Men experience more intense positive affect than women ($\gamma = .18$, $t = 2.58$). Older consumers experience more intense negative affect than younger consumers ($\gamma = .05$, $t = 2.12$), and also lower educated consumers experience more intense negative affect than higher educated consumers ($\gamma = -.15$, $t = -2.59$).

4.5.5 Moderating effects of perceived knowledge

We tested the moderating effects of perceived knowledge through multi-group analyses. The subsamples consisted of the two different knowledge groups. This is a common way of uncovering moderating effects (Stone and Hollenbeck, 1989, see for an application: De Wulf et al., 2001). To test for the moderating influence of perceived knowledge, we set all paths of the structural model for the two knowledge subsamples equal. Next we estimated effect for effect by freeing each time one path that we hypothesized as being influenced by the moderator. The differences in chi-square value between models show whether perceived knowledge operates as a moderator. If the chi-square value decreases significantly from the constrained model to a model in which one relationship is set free this means that perceived knowledge moderates that relationship. The unstandardized parameter estimates with t-values for low and high perceived knowledge are shown in table 4.4.

Table 4.4. Model with interaction effects (unstandardized results with t values)

	Relation	Expected influence of perceived knowledge	Low perceived knowledge		High perceived knowledge		Chi-squared value	Hypothesis accepted?
			b	t	b	t		
H8a	Promotion orientation → Net cognition	weaker	.07	.05	.07	.05	-.98	No
H8b	Promotion orientation → Negative affect	no effect	-.06	.08	-.06	.08	-.22	Yes
H8c	Promotion orientation → Positive affect	no effect	.01	.08	.01	.08	-.01	Yes
H9a	Trust in science and technology → Net cognition	stronger	.14**	.06	.34**	.08	-5.91**	Yes
H9b	Trust in science and technology → Negative affect	no effect	-.25**	.09	-.25*	.09	-2.39	Yes
H9c	Trust in science and technology → Positive affect	no effect	.23**	.08	.23**	.08	.02	Yes
H10a	Perception of control → Net cognition	stronger	.06**	.02	.13**	.03	-3.00*	Yes
H10b	Perception of control → Negative affect	no effect	-.13**	.03	-.13**	.03	-.19	Yes
H10c	Perception of control → Positive affect	no effect	.12**	.03	.12**	.03	-.19	Yes
H11a	Net cognition → Attitude	stronger	1.19**	.09	1.19**	.09	-.03	No
H11b	Net cognition → Purchase intention	stronger	.75**	.36	1.23**	.34	-6.97**	Yes
H11c	Net cognition → Delay	stronger	-.35**	.13	-.35**	.13	-1.28	No
H11d	Net cognition → Negative WOM	stronger	-.10	.15	-.38**	.13	-3.56*	Yes
H11e	Net cognition → Complaining	stronger	-.33**	.12	-.33**	.12	-.33	No
H12a	Negative affect → Attitude	weaker	-.14**	.04	-.14**	.04	-.11	No
H12b	Negative affect → Purchase intention	weaker	-.28**	.07	-.28**	.07	2.42	No
H12c	Negative affect → Delay	weaker	.29**	.06	.29**	.06	-.17	No
H12d	Negative affect → Negative WOM	weaker	.24**	.06	.24**	.06	-.74	No
H12e	Negative affect → Complaining	weaker	.36**	.06	.36**	.06	-.80	No
H13a	Positive affect → Attitude	weaker	.19**	.06	.19**	.06	-.85	No
H13b	Positive affect → Purchase intention	weaker	.11	.11	.33**	.12	-7.03**	No
H13c	Positive affect → Delay	weaker	-.12*	.10	-.12*	.10	.14	No
H13d	Positive affect → Negative WOM	weaker	-.33**	.08	-.33**	.08	-1.17	No
H13e	Positive affect → Complaining	weaker	-.16**	.09	-.16**	.09	.04	No
	Gender (male) → Positive affect		.25**	.08	.04	.10	-2.92*	
	Age → Negative affect		.05**	.02	.05**	.02	-.02	
	Level of education → Negative affect		-.14**	.05	-.14**	.05	-.12	

** p < .05; * p < .10

Contrary to our expectations (H8a), the chi-square value indicates no weaker relationship between promotion orientation and net cognition for consumers with higher knowledge. Hence, H8a is rejected. We hypothesized that perceived knowledge would not moderate the relationships between promotion focus and negative affect (H8b) and between promotion focus and positive affect (H8c). Both hypotheses H8b and H8c are supported.

In line with our expectations (H9a), trust in science and technology has a stronger positive effect on net cognition for consumers with higher perceived knowledge. H9b and H9c posit that the association between trust in science and technology and negative affect and positive affect is not affected by perceived knowledge. There is no difference between the two knowledge groups. Hence H9b and H9c are supported.

We hypothesized that perception of control would have a stronger positive effect on net cognition for consumers with higher perceived knowledge (H10a). This is supported. H10b and H10c predict no effect of perception of control on negative affect and positive affect for consumers with higher perceived knowledge. No differences in chi-square value were revealed. Consequently, H10b and H10c are supported.

Contrary to our expectations (H11a), net cognition does not have a stronger influence on attitude for consumers with higher perceived knowledge. Hence H11a is rejected. In line with H11b, net cognition has a stronger positive relation with purchase intention for consumers with higher perceived knowledge. As a result H11b is supported. We hypothesized a stronger relation for consumers with higher perceived knowledge between net cognition and the decision to delay (H11c). H11c is rejected, as the chi-square value shows no difference. Net cognition was expected to have a stronger effect on negative WOM for consumers with higher perceived knowledge (H11d). This is supported by the results. The hypothesized stronger effect between net cognition and complaining for consumers with stronger perceived knowledge (H11e) is not supported by the chi-squared test. Hence H11e is rejected.

We hypothesized a weaker association for consumers with higher perceived knowledge for the effect of negative affect on attitude (H12a), purchase intention (H12b), delay (H12c), negative WOM (H12d), and complaining (H12e). The chi-square values show no differences for all these effects between the two knowledge groups. As a result we reject H12a, H12b, H12c, H12d, and H12e.

Contrary to H13a, we found no difference between the low and high perceived knowledge groups for the association between positive affect and attitude. Therefore we reject H13a. H13b posits a weaker positive relation between positive affect and purchase intention for consumers with higher perceived knowledge, but the results indicate the opposite, namely a stronger relation. Hence, H13b is rejected. We hypothesized a weaker association for positive affect on delay for consumers with higher perceived knowledge (H13c). The chi-square value indicates no difference. Therefore H13c is rejected. H13d posits a weaker relation between positive affect and negative WOM for consumers with higher perceived knowledge, but no differences were found. Hence H13d is rejected. H13e proposes a weaker association for positive affect with complaining for consumers with higher perceived knowledge. Again no difference was found, however. As a result, H13e is rejected.

No hypotheses were proposed for the moderating effect of perceived knowledge on the relation between the covariates and net cognition, negative affect and positive affect. The results reveal only one difference; men only experience more positive affect than women when they have low perceived knowledge and not when they have high perceived knowledge.

4.6 DISCUSSION

In this chapter, we examined the importance of net cognition, negative affect and positive affect with regard to a radical technology on consumers' responses to this technology. Our framework included three relevant consumers' characteristics as antecedents, net cognition, negative affect, positive affect, and five consumers' responses to radical technologies. The latter consist of attitudinal, purchase-related and communication-related responses. To expand our knowledge regarding consumers' cognition and affect we distinguish between consumers low on perceived knowledge concerning the radical technology, and consumers that consider themselves to be knowledgeable with regard to this technology. We proposed that the first base their response more on their negative and positive affect – because they have no available information – and the latter more on their net cognition – because they know sufficiently about the radical technology. We developed a number of hypotheses and tested our framework on GMF: food manufactured by a controversial

radical technology.

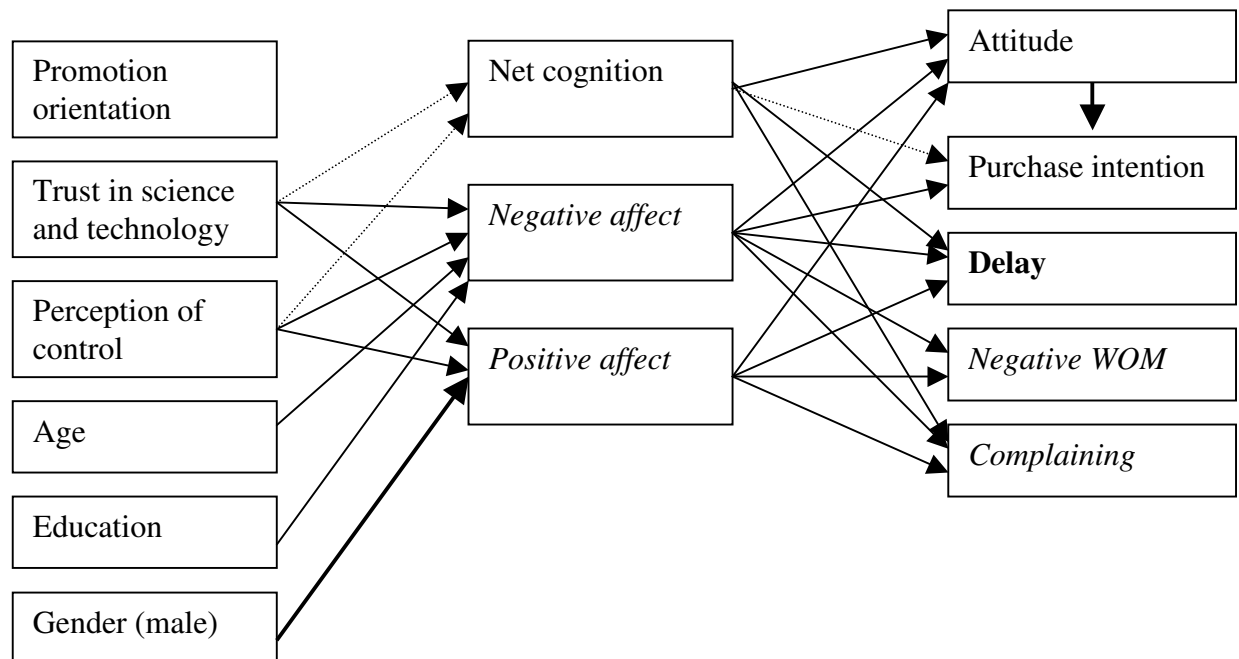
The model with the main relationships provided evidence for the following outcomes. Net cognition is influenced positively by the consumers' trust in science and technology and perception of control. Negative affect is influenced negatively by trust in science and technology, the consumers' perception of control, level of education, and positively by age. Positive affect is influenced positively by trust in science and technology, the consumers' perception of control, and gender. Men experience more intense positive affect than women.

Furthermore attitude is influenced by net cognition, negative affect and positive affect. Purchase intention is impacted upon by net cognition, negative affect, positive affect and consumers' attitude. The decision to delay is influenced by net cognition and negative affect. Negative WOM is influenced by negative affect and positive affect. Complaining is impacted upon by net cognition, negative affect and positive affect.

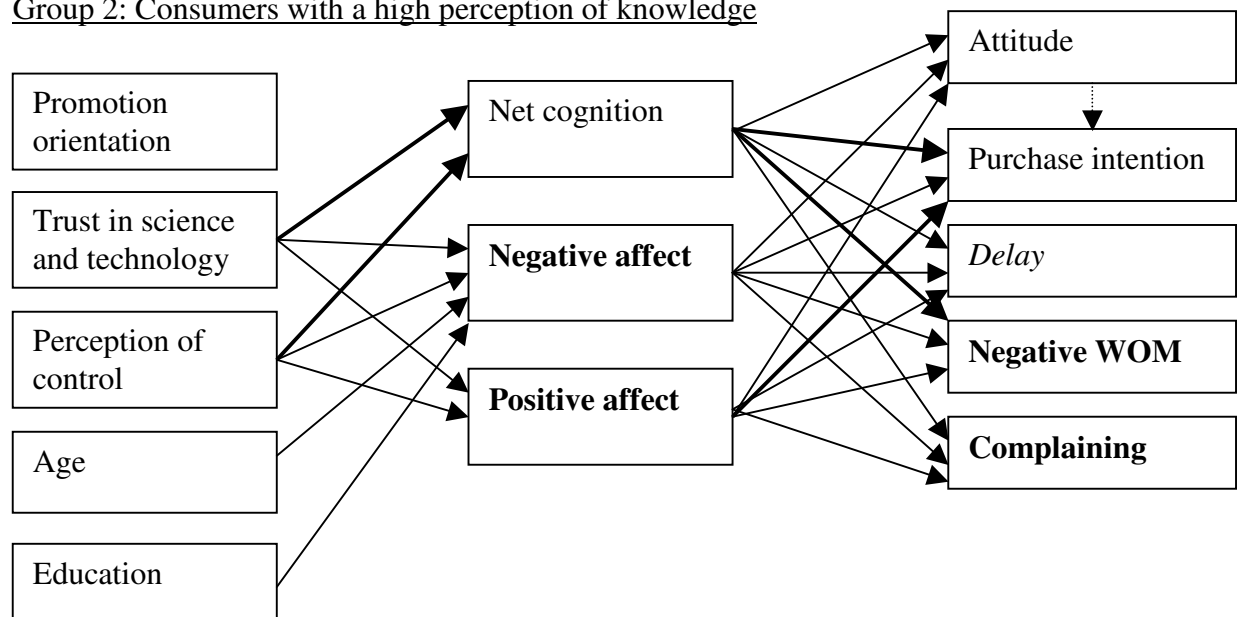
We can infer from these results that net cognition, negative affect and positive affect all have an essential influence on the responses of consumers. Especially negative affect has an important impact on responses of consumers to a radical technology. When including the perceived knowledge of consumers, however, some important differences are revealed (see figure 4.2). We re-estimated model of table 4.4 with only the significant differences. This multi-group model with two groups had a good fit: $\chi^2(105) = 180.72$ ($p < .001$), RSMEA = .06, TLI = .95, CFI = .97 and is shown in figure 4.2.

Figure 4.2. Outcomes per group

Group 1: Consumers with a low perception of knowledge



Group 2: Consumers with a high perception of knowledge



Note: In *italics*: variable has a relatively low score and **bold**: variable has a relatively high score (based on table 4.2). Dotted line: effect is relatively weaker and **bold** line: effect is relatively stronger (based on table 4.4).

In sum, our study has supported that, with regard to the responses of consumers to a radical technology, the impact of net cognition and negative and positive affect differ across consumers with different levels of perceived knowledge. For consumers low on perceived knowledge their net cognition plays a smaller role than for consumers high on perceived knowledge. Negative affect has a strong impact on all responses for both groups. Surprisingly, positive affect has only an impact on the purchase intention of consumers high on perceived knowledge, and not for the consumers low on perceived knowledge. The strong impact of negative affect compared to positive affect is in accordance with previous research (Baumeister et al., 2001). Even though previous research has mainly focused on the cognitions of consumers, our results suggest that negative and positive affect are essential in the understanding and prediction of the responses of consumers, whereas net cognition rather when consumers think they know sufficiently about the radical technology.

Our results show furthermore that consumers that think that they not understand or know enough about the radical technology do not feel less trust in science and technology or less control in choosing. These do impact their net cognition to a lesser extent, however. The impact of socio-demographics on the intensity of net cognition was little, but we did uncover influences of gender, age and education on negative and positive affect. Men only experience more intense positive affect than women when they perceive themselves to be less knowledgeable.

Our results confirm that the attitude and behavioral and communicational responses were influenced by a combination of cognition and affect, and never only cognition or only affect (Edwards and Von Hippel, 1995). This underlines the notion that both are important for the construction of consumers' responses.

Accordingly, taking into account the consumers' perception of knowledge about the radical technology enhanced our understanding of consumers' responses to this technology. These findings are important, because they add insight into how consumers construct their responses. Furthermore, our results confirm that this is not a purely rational process at all. This has important implications for both academic researchers and practitioners.

4.6.1 Implications

The goal of this chapter was to clarify the role of negative and positive affect vs. net cognition in the responses of consumers to a radical technology – GMF. In our framework we identified antecedents related to negative affect, positive affect and net cognition associated with radical technologies. The context-specific antecedents – trust in science and technology, and perception of control – had a substantial influence on the intensity of net cognition and negative and positive affect. Moreover, we provided evidence that the level of perceived knowledge distinguishes to a certain extent how consumers construct their responses to a radical technology. Consumers that have the idea that they do not know sufficiently about the radical technology will rely less on their net cognition than consumers with a high perception of knowledge. These results are consistent with previous research (Pham, 1998; Schwarz and Clore, 1988). Consistent with previous research especially negative affect plays a vital role, as compared to positive affect (see for an overview; Baumeister et al., 2001).

Our general findings also generate relevant insights for practitioners. Consumers' trust in science and technology has an important influence on their negative and positive affect, and for consumers with higher perceived knowledge also on their net cognition. It is therefore important to make science and technology more accessible to the general public, so that consumers can relate to it and no longer think that scientists do not take into account what the general public wants. This is especially crucial for biotechnology. Consumers quickly have the feeling that scientists are tampering with nature. In addition, for all consumers their perception of control plays an essential role in their construction of their net cognition, negative affect and positive affect. This means that labeling of products manufactured by a radical technology and transparency of the market have an important indirect impact on the responses of consumers to the radical technology.

Furthermore, companies and public policy makers need to think about their advertising/communication strategy. Most consumers oppose GMF, and previous research has shown that it is not simple to change this, because when confronted with the term GMF consumers actually become more negative, irrelevant of the valence of the information provided (Scholderer and Frewer, 2003). To change an attitude it is important to know whether consumers rely on their cognitions or affect (Drolet and Aaker, 2002). We have shown in this research that consumers with low perceived knowledge use mainly their negative and positive affect, whereas consumers with a

high perception of knowledge use their negative and positive affect as well as their net cognition. In addition, compared to consumers with a high perception of knowledge, consumers with a low perception of knowledge are usually female, of a lower social class, and less interested in food and health issues. Most importantly, these consumers are rather passive, because they think that health and risk issues should be dealt with by experts and they use less information sources than high perceived knowledge consumers. It can therefore be very difficult to not only change the mind of consumers with a low perception of knowledge, but also to reach them. Their main strategy to deal with radical technologies is to delay the decision as long as possible and see what happens. They are relatively harmless, but could be a lost opportunity. High knowledge consumers are dealing with radical technologies in a pro-active way, and this includes searching for information, but also giving information. It is thus important to first focus on these consumers, as they can do the most damage.

4.6.2 Limitations and directions for future research

Our study has several limitations, which offer avenues for future research. Our research can be extended in several ways. Firstly, the empirical part of the study focuses on only one radical technology, namely food produced by gene technology. This makes it difficult to generalize to other radical technologies, as this is a very specific type of biotechnology. Moreover, it received a large amount of negative media attention, especially in Europe. Future research could test our framework on other products manufactured by radical technologies or radical technologies themselves.

Secondly, our framework could be extended to other countries than The Netherlands. Previous research has shown that consumers in different countries differ in their trust in science and technology (Steger et al., 1989) and attitude toward GMF (Bredahl, 2001). Furthermore, there exists a huge difference between American consumers on the one hand and Japanese and European consumers on the other hand in their acceptance of gene technology in food production (Gaskell et al., 1999). Whereas the first do not really seem to care about it, consumers in Japan and Europe have fiercely fought against the introduction of GMF.

Thirdly, more antecedents can be included to better predict the intensity of net cognition and negative and positive affect. These antecedents can be varied conditionally upon the product and country where the research is conducted.

Fourthly, future research could examine how consumers can be segmented and recognized as groups with high and low perceived knowledge. The next step would then be to investigate how consumers with different perceived knowledge levels can be reached.

CHAPTER 5

THE RELATIONS BETWEEN FOOD-RELATED LIFESTYLE VALUES, FUNCTIONAL FOOD EVALUATIONS, EMOTIONS AND PURCHASE INTENTION FOR FOUR AGE GROUPS

5.1 INTRODUCTION

The functional food market is booming (Business Week, 2005). Functional food products are “food products that have been modified or enriched with naturally occurring substances (e.g., vitamins) with a specific physiological preventive and/or health boosting effect” (Poulsen, 1999, p.1). Moreover, these products are consumed as a part of the normal diet. In other words, functional food products allow consumers to eat their regular diet while maintaining or even improving their health, without taking drugs or any extra effort (Bech-Larsen and Grunert, 2003). Functional food products therefore seem to thrive on the combination of two important food qualities for consumers in contemporary society (AC Nielsen, 2004). The first is *health*, whose importance is strengthened by our aging society (Sloan, 1999), and the second is *convenience* (Scholderer and Grunert, 2005).

Yet despite their advantages, there are some challenges in marketing functional food products (Menrad, 2003), as they differ from conventional foods in several ways. The two most important differences are that the health effect is very specific and that at least some technical manipulation is necessary to produce these products (Urala and Lahteenmaki, 2004). Consumers’ evaluation of functional food products therefore appears to be on a very delicate balance between negative and positive emotions. Consumers experience positive emotions, because the product provides a clear health benefit, but negative emotions due to the high uncertainty and risks related to the novelty of the production process (chapters 2 and 3 of this dissertation). It is therefore essential to obtain deeper insights as to how consumers arrive at this balance. Accordingly, in this chapter we will investigate who feels *what* and, most importantly, *why*. This is of great importance to companies who (want to) market functional food products.

In this chapter we will develop a conceptual framework that incorporates general food-related lifestyle values that precede the functional food product evaluations (see for a similar approach; Grunert et al., 1993). These evaluations influence the emotions of consumers with regard to these products. Furthermore, we will include the effect of the consumers' emotions on their purchase intention. In addition to examining these main effect relationships, we also study the moderating role of a key individual-difference variable in our Western societies: age (Sloan, 1999).

5.2 CONCEPTUAL FRAMEWORK

Emotions → Purchase intention

A wide variety of consumer research applications have added insight into the role of emotions (for an overview, see chapter 2 of this dissertation). Emotions have an important influence on consumers' intention to purchase a product (Bagozzi et al., 1999). Including age differences may make it clearer as to for whom emotions play a prominent role in their intended behavior.

Product evaluations → Emotions

Emotions are subjective experiences caused by the evaluation of a situation or product (Frijda, 1988). Because different people can evaluate the same situation differently, different emotions can result with respect to the same stimulus (Frijda, 1988). The theoretical relation between these evaluations and emotions has been researched extensively (e.g., Frijda et al., 1989; Roseman et al., 1996; Smith and Ellsworth, 1985; Smith and Lazarus, 1993), and will be employed in this research. Yet there is a lack of research into the individual differences in this evaluation process (Scherer, 1999). To capture these we will compare consumers of different age groups.

Values → Product evaluations

Product evaluations are influenced by the values of consumers (Lastovicka, 1982). A value is “a centrally held, enduring belief which guides actions and judgments across specific situations and beyond immediate goals to more ultimate end-states of existence. Values are typically developed over the course of a lifetime and are not easily changed” (Rokeach, 1968, p.161). What a consumer deeply

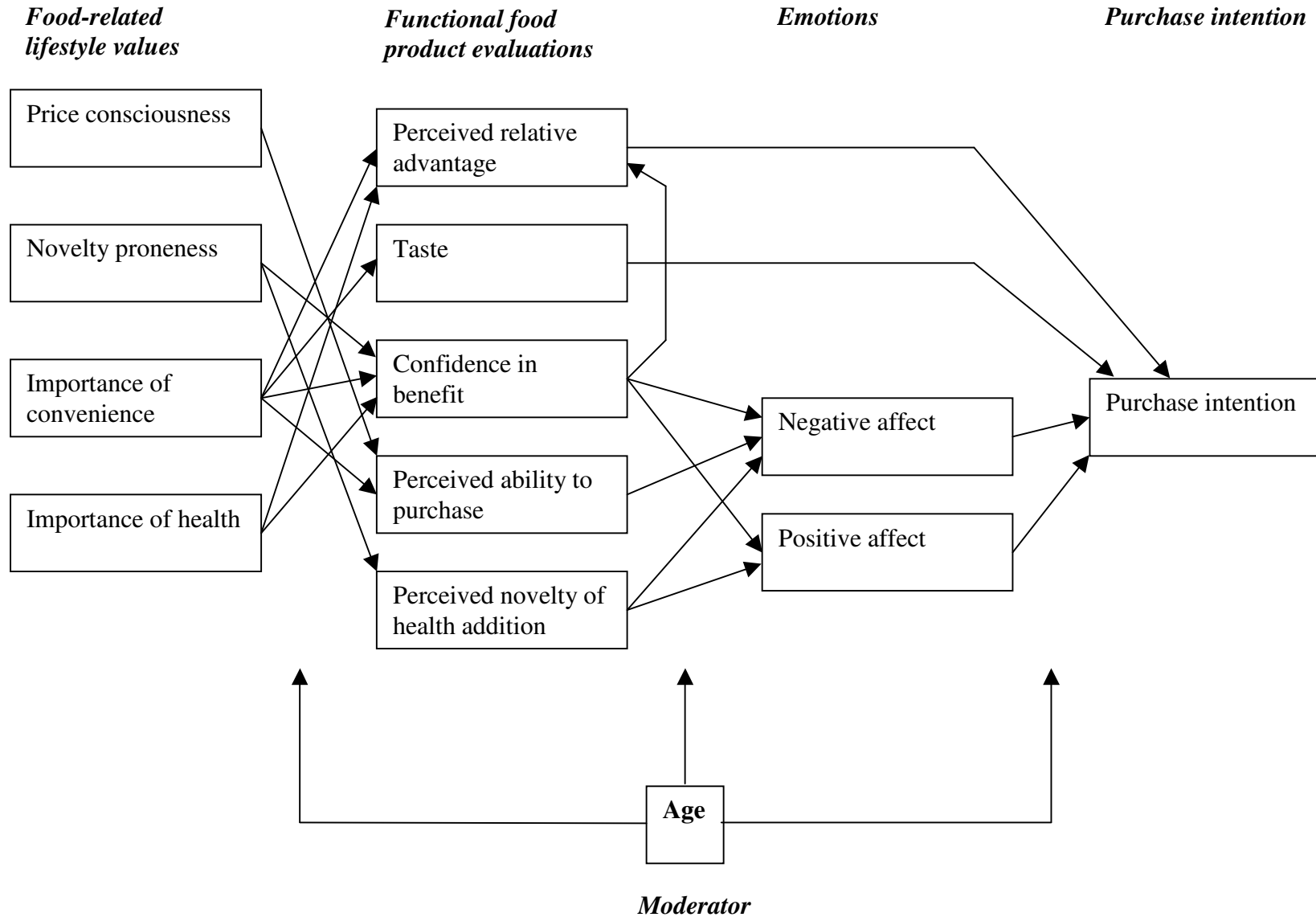
believes in is influenced by his personal history and has an impact on how he evaluates a certain product. As a result, we expect that values influence product evaluations, but also that there are disparate effects for consumers with a different age.

Homer and Kahle (1991) and Vinson et al. (1977) have posited a value-attitude-behavior hierarchy, where values influence product evaluations, which impact behavior (for an overview, see Grunert et al., 1993). It is very difficult, however, to connect broad general values to specific feelings (Burroughs and Rindfleisch, 2002). To address this issue, the concept of domain-specific values has been introduced (Raaij and Verhallen, 1994). Within the context of foods, Grunert et al. (1993) have proposed food-related lifestyle values. These food-related lifestyle items have an intermediate place between general values and food product evaluations (Brunso and Grunert, 1998).

Hence our main-effects model looks as follows: *Food-related lifestyle values* → *Functional food product evaluations* → *Emotions* → *Purchase intention*

In figure 5.1, we present our conceptual framework, including the food-related lifestyle values, functional food product evaluations, emotions, and purchase intention, as well as the moderating role of age. The hypotheses underlying this framework are discussed subsequently.

Figure 5.1. Conceptual framework



5.3 RESEARCH HYPOTHESES

There is relatively little literature with respect to the relations proposed in our framework that can guide us in the construction of our hypotheses. In the spirit of scientific discovery we therefore develop hypotheses in an exploratory fashion.

5.3.1 Emotions

Negative and positive affect are the most often encountered emotion dimensions in the marketing literature (chapter 2 of this dissertation). Negative affect pertains to the negative sensations and feelings that a consumer experiences in response to a product or situation, and positive affect is its positive counterpart (Dubé et al, 2003). In chapter 2 of this dissertation we show that these two dimensions are largely independent. Consumers that experience more negative affect are expected to have a lower intention to purchase the functional food product than those that experience less negative affect. Consumers that experience more positive affect will be more inclined to purchase the functional food product than those experiencing less positive affect.

H1: Negative affect associated with the functional food product has a negative influence on the purchase intention of the functional food product.

H2: Positive affect associated with the functional food product has a positive influence on the purchase intention of the functional food product.

5.3.2 Functional food product evaluations

Based on previous research (Poulsen, 1999; Urala and Lahteenmaki, 2004), the following five functional food product evaluations are distinguished: perceived relative advantage, taste, confidence in the benefit, perceived ability to purchase, and perceived novelty of the health addition.

Perceived relative advantage is the degree to which the consumer thinks that the product will contain a significant improvement for him personally compared to other products (Rogers, 2005). Only when the functional food product is perceived to have enough benefit for him the consumer will feel inclined to purchase the functional food product (Urala and Lahteenmaki, 2004). For example, when a product can address a person's illness, consumers showed a higher purchase intention (Van Kleef

et al., 2005). We thus hypothesize that, independent from the emotions associated with the functional food product, perceived relative advantage has a direct influence on purchase intention.

H3: Perceived personal relevance of the functional food product has a positive influence on the purchase intention of the functional food product.

Taste reflects to what extent the functional food product tastes at least as good as its conventional counterpart without the health addition. Taste is one of the most important choice factors when choosing functional foods (Urala and Lahteenmaki, 2003). Most consumers are not willing to give up taste for health (Gilbert, 2000). We therefore hypothesize that, independent of negative and positive affect and perceived relative advantage, taste has a direct influence on the purchase intention.

H4: Taste of the functional food product has a positive influence on the purchase intention of the functional food product.

Confidence in the benefit reflects the positive belief of the consumer in the added health effect of the functional food product. It includes both the confidence that something beneficial will occur and the reward itself that is attached to the functional food product (Roseman et al., 1996; Scherer, 1986). The level of confidence, that a functional food product has a certain benefit, has been previously connected to both negative and positive emotions (Roseman et al., 1996; Scherer, 1986). Once consumers start doubting whether or not the functional food product has any added benefit, even though a higher price is asked, their negative emotions will increase. Thus, consumers that have more trust in the benefit of the functional food product will experience less negative emotions than those who have less confidence in the functional food product. When a consumer more strongly believes in the benefit of a functional food product, he will experience more feelings of contentment and happiness. Hence, we hypothesize that a product associated with more confidence in the benefit brings about an increase in the positive emotions of consumers. In addition, the uncertainty about the benefit of a novel product has an impact on its perceived relative advantage (Rogers, 2005). If consumers believe the claimed benefit of a functional food product, they will be more inclined to consider this product as

advantageous for themselves than if they have no faith in the health claim. Consequently, consumers that have a firmer belief in the health benefit of the functional food product will attach more relative advantage to it than those who are less confident about the value of the functional food product.

H5: More confidence in the benefit associated with the functional food product reduces the negative affect associated with the functional food product.

H6: More confidence in the benefit associated with the functional food product increases the positive affect associated with the functional food product.

H7: More confidence in the benefit associated with the functional food product increases the perceived relative advantage of the functional food product.

Perceived ability to purchase a functional food product reflects the belief that a consumer can buy the functional food product if he wants to, in particular when taking into account the price. The price of functional food products is often higher than conventional products, and some consumers believe that the price asked by producers is too high (Poulsen, 1999). During interviews with consumers some comments were, for example, “These products are ridiculously expensive” and “I get angry when I think about the price that is charged for functional food products.” Consequently, when a consumer considers the product as too expensive and thinks that he cannot purchase it for that reason, he will become frustrated and angry.

H8: Higher perceived ability to purchase a functional food product reduces the negative affect associated with the functional food product.

Novelty of the health addition considers how new consumers think it is to add this health benefit to the specific food product. The degree of familiarity is very important for consumers to accept functional food products (Menrad, 2003). Products that are perceived as very new cause negative emotions among consumers (Veryzer, 1998), and a reduction in the positive feelings associated with the functional food product.

H9: High perceived novelty of the health addition to the food product increases the negative affect associated with the functional food product.

H10: High perceived novelty of the health addition to the food product reduces the positive affect associated with the functional food product.

5.3.3 Food-related lifestyle values

We include four food-related lifestyle values relevant for the specific food product in our model (Grunert et al., 1993). Functional food products are *new* food products with a specific *health* benefit, allowing for *convenient* health, charged at a *premium price*. Hence we include the following values: novelty proneness, importance of health, importance of convenience, and price consciousness.

Novelty proneness represents to what extent consumers like to try out new food products and experiment in the kitchen. Functional food products are new food products and differ in several ways from conventional food products (Urala and Lahteenmaki, 2004). The novelty proneness of consumers will therefore play an important role in their evaluation of these products. When consumers are in favor of new food products they will have more faith in the added value of functional food products than those who do not. Consumers that are more novelty prone will therefore be more confident about the benefit attached to the functional food product. In addition, novelty prone consumers will be more used to new food products. As a consequence, they consider the addition to the functional food product to be less novel.

H11: Novelty proneness has a positive influence on the confidence in the benefit associated with a functional food product.

H12: Novelty proneness has a negative influence on the perceived novelty of the health addition to the food product.

Importance of health is a desired higher-order product attribute in the framework of Grunert et al. (1993) and reflects the extent to which consumers think that a food product will affect their health. This means consumers that consider health as important try to eat healthily and avoid eating unhealthy food (Brunso et al., 2002). Health is an important aspect in the evaluation of a functional food product (Poulsen, 1999). Consumers that attach more importance to their health will be more inclined to see the functional food product as having a significant advantage to them than those

less concerned about their health. As such, the perceived relative advantage of the functional food product will increase when health is more important. Also, consumers that attach more importance to their health will be more inclined to believe that the functional food product has a significant reward than those who are less engaged with their health. As such the confidence in the benefit associated with the functional food product will increase.

H13: Importance of health has a positive influence on the perceived relative advantage of the functional food product.

H14: Importance of health has a positive influence on the confidence in the benefit associated with the functional food product.

Importance of convenience addresses in this study the extent to which consumers make use of effort-reducing solutions in the preparation of meals (e.g., using instant mixes, pre-cut vegetables) (Scholderer and Grunert, 2005). Consumers like functional food products, because they are a way out of nutritional gaps caused by our busy lifestyle (Gilbert, 2000). The functional food product is perceived to have more advantage because consumers can maintain their health in a convenient way (De Jong et al., 2003). Perceived relative advantage of the functional food product will thus increase for consumers that value convenience highly.

Even though convenience food products are constantly improved, they cannot beat self-made meals in terms of taste. Convenience-oriented consumers will be more used to this possibly less natural taste of convenience food products. They will therefore evaluate the taste of a functional food product to be better than someone who does not find convenience important.

Functional food products allow consumers to improve or maintain their health in a proactive and convenient way (De Jong et al., 2003). Consumers that place more value on convenience will put more faith in the reward associated with the functional food product. They believe that convenience can be combined with health, whereas those that are not convenience oriented trust rather in a good diet. One consumer, that did not find convenience important, commented: “A disadvantage of functional food products is that people become lazy. Maybe they should make more time for themselves and eat better that way.” As a result, consumers that are focused on

convenience are more confident about the benefit of functional food products than those who do not.

Convenience food products, like microwave meals, are more expensive than if one would prepare the meal oneself. Convenience-oriented consumers will thus be more used to the price premium attached to ready-made meals and as a result more willing to step over the higher price of functional food products. Because its higher price is not uncommon to these consumers, they will feel more able to purchase a functional food product.

H15: Importance of convenience has a positive influence on the perceived relative advantage of the functional food product.

H16: Importance of convenience has a positive influence on the taste of the functional food product.

H17: Importance of convenience has a positive influence on the confidence in the benefit associated with the functional food product.

H18: Importance of convenience has a positive influence on the perceived ability to purchase a functional food product.

Price consciousness reflects to what extent consumers are aware of prices when shopping and take them into account in their decision process. Functional food products often have a higher price than their conventional counterpart (Menrad, 2003). For most consumers this is no problem and they are willing to pay the price premium (Larue et al., 2004). But consumers that are more price conscious will be more aware of and place a higher weight on this price than consumers that are less price conscious. As a result, price conscious consumers feel less able to purchase the functional food product, because it is more expensive than the conventional product. In sum, we posit:

H19: Price consciousness has a negative influence on the perceived ability to purchase a functional food product.

5.3.4 Moderating role of age

Previous research has documented the dissimilar acceptance of functional foods over different age groups (e.g. Poulsen, 1999; Schiffman, 1997; Verbeke, 2005). Age differences in consumer behavior, and more specifically related to health, seem natural, as behavior in later life is believed to be the outcome of aging processes and experiences over the life span (Moschis, 1994). These experiences differ as a result of dynamic historical and cultural contexts in which individuals are embedded. Hence every age group is a unique segment and has its own values and beliefs (Moschis et al., 1997).

Emotions

When older consumers are exposed to stimuli featuring themes that are relevant to their age group, they show strong affective reactions (Kunzman and Gruhn, 2005). Because older consumers consider functional food products as more relevant (e.g., Verbeke, 2005), they will have stronger emotions. We hypothesize that these emotions will also play a larger role in their decision process. As a consequence the relation of negative and positive affect with purchase intention will become stronger for older consumers. Thus, we posit:

H20: The negative relation between negative affect and purchase intention will be stronger when age is higher.

H21: The positive relation between positive affect and purchase intention will be stronger when age is higher.

Functional food product evaluations

Perceived relative advantage. Younger consumers are not so easily convinced about the personal advantage of a functional food product. One consumer (26 years) commented that “Functional food products are good, but for me they are not important.” Older consumers like to stay active and healthy and if they think that a functional food product will help them with that, they are more inclined to purchase the functional food product (Moschis, 1994). We therefore expect that the effect of perceived relative advantage on purchase intention becomes stronger with higher age.

H22: The positive relation between perceived relative advantage and purchase intention will be stronger when age is higher.

Taste. Younger consumers are not as willing as older consumers to compromise on the taste of functional foods to obtain the health effects (Urala and Lahteenmaki, 2004). This implies that taste will have a larger influence for younger consumers on their purchase intention than for older consumers. In addition, older consumers are less able to taste certain flavors, making them less sensitive for the sometimes occurring “off-taste” of functional food products (Schiffman, 1997). Hence we propose the following hypothesis:

H23: The positive relation between taste and purchase intention will be weaker when age is higher.

Confidence in benefit. When consumers believe that a functional food product has a benefit for them, their emotions and perceived relative advantage will intensify (Urala and Lahteenmaki, 2004). Older consumers that trust the high reward of a functional food product, however, will become more accepting of the product (Gilly and Zeithaml, 1985). We thus conclude that when age increases the effect of confidence in the benefit of the functional food will become stronger.

H24a: The negative relation between confidence in the benefit and negative affect will be stronger when age is higher.

H24b: The positive relation between confidence in the benefit and positive affect will be stronger when age is higher.

H24c: The positive relation between confidence in the benefit and perceived relative advantage will be stronger when age is higher.

Perceived ability to purchase. Compared to middle-aged consumers, younger and older consumers have in general lower incomes or a smaller personal wealth (Moschis et al., 2004). Therefore, they feel angrier when they think that they cannot afford the functional food product. Consequently, they will experience stronger negative affect when they think they cannot purchase the functional food product. We thus propose that the negative relation between perceived ability and negative affect

will be stronger for the younger and older consumers compared to the middle-aged consumers. Thus, we propose the following:

H25: The negative relation between perceived ability to purchase a functional food product and negative affect is stronger for the younger and older consumers than for the middle-aged consumers.

Perceived novelty of the health addition. Older consumers only accept a novel product when they are convinced of its benefit (Gilly and Zeithaml, 1985). Thus when they consider a functional food product as too novel, this means that they do not believe that adding a certain health benefit to a specific food product is acceptable. As a result they will experience more negative affect and less positive affect and eventually reject the product.

H26a: The positive relation between the perceived novelty of the health addition and negative affect will be stronger when age is higher.

H26b: The negative relation between the perceived novelty of the health addition and positive affect will be stronger when age is higher.

Values

Novelty proneness. The degree to which consumers like to try out new products has been shown to decrease over age (Steenkamp et al., 1999). Extending this thought, we propose that the novelty proneness of older consumers has a weaker impact on their confidence in the benefit and perceived novelty of the health addition than for younger consumers. We posit:

H27a: The negative relation between novelty proneness and confidence in the benefit will be weaker when age is higher.

H27b: The positive relation between novelty proneness and perceived novelty of the health addition to the food product will be weaker when age is higher.

Importance of health. Younger consumers consider the advantage of functional food products as more useful for older consumers and are more skeptical toward its benefit (Urala and Lahteenmaki, 2004). They are more focused on the fat

and calorie content of foods than elderly consumers (Oakes, 2003). This means that for this age group health is not directly linked to the relative advantage and confidence in the benefit of a functional food product, but rather to fat and calories in food products. Older consumers try to stay young by using products aimed at helping them to maintain a youthful image (Moschis, 1994). They are willing to do a lot to stay healthy and active (Poulsen, 1999). This means that if functional food products promise them an active lifestyle, they will trust and highly value these products. Hence, the value health has a stronger influence on perceived relative advantage and confidence in the benefit of the functional food product for older consumers.

H28a: The positive relation between importance of health and perceived relative advantage will be stronger when age is higher.

H28b: The positive relation between importance of health and confidence in the benefit will be stronger when age is higher.

Importance of convenience. The younger consumers are just setting up their own household and that involves a lot of responsibilities, especially if they also have little children. For them convenience plays an important role as it facilitates their duties. Thus their perceived relative advantage, confidence in the benefit, and perceived ability to purchase will be stronger influenced by the importance they attach to convenience compared to consumers of other ages. For older consumers convenience is very important (Poulsen, 1999) and thus impacts their perceived relative advantage, confidence in benefit, and perceived ability to purchase stronger than the other age groups. Therefore we propose that the positive relation between importance of convenience with perceived relative advantage, confidence in the benefit, and perceived ability to purchase will be strongest for the younger consumers and older consumers. When consumers get older their tasting abilities become less sensitive (Schiffman, 1997) and taste is less important than for younger consumers (Urala and Lahteenmaki, 2004). As such we predict a weaker relation between importance of convenience and taste when age is higher. Hence we hypothesize:

H29a: The positive relation between importance of convenience and perceived relative advantage will be stronger for younger and older consumers than for middle-aged consumers.

H29b: The positive relation between importance of convenience and confidence in the benefit will be stronger for younger and older consumers than for middle-aged consumers.

H29c: The positive relation between importance of convenience and perceived ability to purchase will be stronger for younger and older consumers than for middle-aged consumers.

H29d: The positive relation between importance of convenience and taste will be weaker when age is higher.

Price consciousness. The price consciousness of the younger and older consumers is emphasized when they are considering whether they can afford the functional food product or not (Lappalainen et al., 1998). This reflects a stronger negative effect of price consciousness on the perceived ability to purchase a functional food product.

H30: The negative relation between price consciousness and perceived ability to purchase a functional food product will be stronger for the younger and older consumers than for the middle-aged consumers.

5.4 METHOD

5.4.1 Procedure

Our hypotheses were tested using 793 Dutch consumers that filled out a questionnaire. CentERdata, a survey research institute affiliated with the Faculty of Economics and Business Administration at Tilburg University, carried out the data collection. CentERdata is specialized in Internet-based surveys, and carries this out through a telepanel, the CentERpanel. This panel consists of households in the Netherlands that fill out a questionnaire on the Internet every week. For our study only those respondents were included that are responsible for at least half of the grocery shopping in their household.

Pre-tests among grocery shoppers at a local supermarket indicated that almost no consumer knows the term “functional food product”. This supports previous research (Menrad, 2003). Even when confronted with a functional food product type

(e.g., margarine with added plant sterols) the awareness of this sample of shoppers varies between 11% and 87% for different functional food product types. This number increases once the brand name was mentioned (e.g., Becel Pro-Active). Even consumers regularly using the product often only know the benefit itself (e.g., lowers cholesterol levels), rather than the functional food product type. We decided to include four different functional food products and gave respondents a full description and examples of brands under which this product was sold. These functional food products were: fruit juice with extra vitamins, margarine with plant sterols, yogurt with added bacteria cultures, and eggs with omega-3 fatty acids. Every respondent was asked about one functional food product to avoid overburdening. In addition consumers were asked in advance whether they regularly purchase in the particular product category or not. When they never buy e.g., margarine, it is of course also of no use to ask them if they intent to buy margarine with plant sterols.

Afterwards we pooled the data after mean-centering the items per functional food product type. This was done to control for functional food product specific effects. We followed the multi-group testing procedure proposed by Steenkamp and Baumgartner (1998) to test whether pooling of the data was allowed. First, we estimated a baseline model where the hypothesized factor loadings for the four functional food product types were allowed to be free (configural invariance). Next, we constrained the matrix of factor loadings to be invariant across the functional food product types (metric invariance). As can be seen in table 5.1, metric invariance was supported. Although the increase in chi-square value between the model of configural invariance and metric invariance was significant ($\Delta\chi^2(57) = 117.82$, $p < .01$), this is not unexpected (Steenkamp and Van Trijp, 1991). CFI declined .02, but TLI and CAIC, which take both model fit and parsimony into account, actually improved. Hence we can pool the data across the four functional food product types.

Table 5.1. Invariance tests of the conceptual model across four types of functional food

	χ^2 value	df	CAIC	CFI	TLI
Configural invariance	517.44	164	1653.46	.87	.79
Metric invariance	635.26	221	1333.76	.85	.82

5.4.2 Age groups

Most studies only distinguish between older and younger consumers and find that older women are more positive toward functional food products (e.g. Poulsen, 1999; Schiffman, 1997; Verbeke, 2005). Yet it is unclear from the literature as to who is young and who is old (Moschis et al., 1997). To allow for sufficient diversity without losing generalizability we use in our study four age groups ranging from 25 to 70 years old. We chose these limits because only consumers that are responsible for at least half of the grocery shopping in their household are included. Before the age of 25 many people live with their parents or in a student house. Beyond the age of 70, many live in an elderly home or drastically reduce cooking themselves.

The first age group is the *youngest* age group and consists of 201 consumers between 25 and 34 years old. The second group consists of 177 consumers between 35 and 44 years old. The third group consists of 226 consumers between 45 and 56 years old. The fourth group is the *eldest* age group and consists of 189 consumers between 57 and 70 years old.

Table 5.2 shows the profile of the four age groups. ANOVA with multiple comparisons (LSD) and chi-square on cross-tabulation were used to investigate whether the mean values across age groups are significantly different.

The age groups are more or less equal in size and consist mainly of women ($\chi^2(1) = 4.14$, n.s.). This suggests that the traditional view that women mostly do the household grocery shopping still holds. There are no differences in social class among the four age groups ($F(3,783) = .30$, n.s.), but as age increases the education level of consumers becomes lower ($F(3,783) = 17.78$, $p < .05$). A reason for this could be that it is only of later generations that higher education is available to all strata of the population.

Differences in the percentage of respondents that works and number of children in the household were revealed ($F(3,783) = 348.83$, $p < .05$ and $F(3,783) = 40.45$, $p < .05$, resp.). The youngest age group (25 to 34) has the highest percentage of respondents that are working, and has a fairly low number of children. In the 35 to 44 and 45 to 56 groups, fewer women are working, probably to take care of the children. The eldest age group (57 to 70) has the lowest percentage of working respondents, as most people retire at the beginning of their 60s. In addition, these respondents have the smallest household size ($F(3,783) = 24.01$, $p < .05$), as well as number of children.

Table 5.2. Mean values, with standard deviation between brackets (if applicable), of socio-demographics

Socio-demographics	25 to 34 years old		35 to 44 years old		45 to 56 years old		57 to 70 years old		F/χ^2
Number of respondents	201		177		226		189		
Gender (female)	78%		71%		69%		73%		4.14
Social class (SES) (1 = high; 5 = low)	2.50 ^a	(.99)	2.47 ^a	(1.01)	2.51 ^a	(1.03)	2.57 ^a	(1.13)	.30
Education level (1 = low; 6 = high)	4.17 ^a	(1.29)	3.69 ^b	(1.38)	3.49 ^b	(1.42)	3.15 ^c	(1.53)	17.78**
Works (has paid job)	76%		65%		65%		21%		348.83**
Number of children	.74 ^a	(1.06)	1.28 ^b	(1.17)	.90 ^c	(1.15)	.14 ^d	(.44)	40.45**
Householdsize	2.33 ^a	(1.36)	2.98 ^b	(1.52)	2.55 ^c	(1.38)	1.86 ^d	(.68)	24.01**
Household income (Euro)	2783 ^a	(1442)	4769 ^b	(14338)	3984 ^{bc}	(5696)	3341 ^{ac}	(3179)	2.39*
Living situation									159.27**
Single	37%		28%		27%		28%		
Partner, no children	23%		11%		27%		60%		
Partner, with children	36%		57%		36%		10%		
Single, with children	4%		4%		8%		1%		
Size of community (1 = large; 5 = small)	2.95 ^a	(1.36)	2.98 ^{ab}	(1.33)	2.95 ^a	(1.44)	3.19 ^{ab}	(1.29)	1.36
Interest in functional food	-.39 ^a	(1.00)	-.07 ^b	(1.11)	.08 ^b	(1.12)	.38 ^c	(1.27)	15.54**

Note: Different superscripts reflect a significant difference of the intensity at a p-value < 0.05 (one-sided)

** p < .05

* p < .10

The 35 to 44 age group has the largest households, as this is the age bracket at which most families have already children (compared to the 25 to 34 age group) and these children are not yet leaving the house (compared to the 45 to 56 age group). Even though most respondents in the 25 to 34 age group are working, their household income is the lowest ($F(3,783) = 2.39, p < .10$). Most likely because this is the age at which most people start working and naturally as experience and careers advance, income rises as well. After the age of 45, however, income starts decreasing again.

The living situation also reflects the previously discussed profile. The respondents in the 25 to 34 age group are mostly either single (37%) or have a partner and children (36%). The consumers in the 35 to 44 age group have most often a partner and children (58%). This percentage decreases for the consumers in the 45 to 56 age group to 36%. The consumers in the 56 to 70 age group most often live with a partner without children (60%). The size of the community where respondents live is the same for all groups ($F(3,783) = 1.36, n.s.$), although the eldest age group seem to have the tendency to live in smaller communities. In addition, the interest in functional food (controlled for functional food product type) reveals that interest increases with age ($F(3,783) = 15.54, p < .05$). This supports previous research (Verbeke, 2005).

5.4.3 Measures

All scales used, along with their reliability, are documented in measurement appendix C. The item measuring *purchase intention* was based on chapter 4 of this dissertation. To measure *negative affect* respondents were asked to indicate to what extent they experience twelve negative emotions when thinking about a functional food product. In addition, respondents were asked to indicate to what extent they experience eight positive emotions when thinking about a functional food product to measure *positive affect*. These emotion items have been shown to be relevant for functional food products in chapter 2 of this dissertation.

The functional food product evaluations *perceived relative advantage*, *confidence in the benefit*, *ability to purchase*, and *novelty of the addition* are adapted from appraisal theory to fit the specific situation (Roseman et al., 1996; Scherer, 1986). We adjusted their abstract items focused on events and situations to suit the specific functional food products. Items measuring goal significance of an event have been adapted to measure *perceived relative advantage*. *Confidence in the benefit* was

based on the items of (intrinsic) pleasantness. *Ability to purchase* was based on the perceived coping potential. *Novelty of the addition* was adapted from the novelty of a specific event. The item measuring *taste* was taken from a previous study about functional foods (Urali and Lahteenmaki, 2004).

The values *novelty proneness*, *importance of health*, *importance of convenience*, and *price consciousness* are based on a selection of items from the food-related lifestyle instrument (Grunert et al., 1997).

5.5 RESULTS

5.5.1 Measurement validation

Before testing our hypotheses, the measures were validated using confirmatory factor analysis (CFA). These analyses were performed on the covariance matrix (matrices) using LISREL 8.54. The food-related lifestyle values were tested separately from the product specific variables. The latter included the functional food product evaluations and emotions. Model fit for the food-related lifestyle values was good: $\chi^2(183) = 1109.69$ ($p < .001$), Root Mean Square Error of Approximation (RSMEA) = .08, Tucker-Lewis Index (TLI) = .92, Comparative Fit Measure (CFI) = .93. Although the chi-square value was highly significant (not unexpected given the large sample size; Anderson and Gerbing, 1988), other indicators suggest a good model fit. The RSMEA is .08, representing reasonable errors of approximation in the population. TLI and CFI are both well above the suggested cutoff of .90. All factor loadings were significant at $p < .001$, and 90% of the standardized factor loadings were above .50, with an average factor loading of .73. All factor correlations between the food-related lifestyle values were significantly below unity ($p < .001$). This means that the constructs are sufficiently different from each other. In sum, convergent and discriminant validity of the measures is supported (Anderson and Gerbing, 1988).

Validity was also established for the functional food product-specific variables. The fit of the CFA model was good: $\chi^2(399) = 2194.79$ ($p < .001$), RSMEA = .08, TLI = .96, CFI = .96. All factor loadings were significant at $p < .001$ and 97% was above .50, with an average factor loading of .74. The correlations between the constructs were here also significantly below unity ($p < .001$), supporting convergent and discriminant validity of the functional food product-specific measures.

5.5.2 Cross-age group measurement validation

Next the measures for the four different age groups were validated. To do this, configural and metric invariance were tested using multigroup CFA (Steenkamp and Baumgartner, 1998). Configural invariance of the four-factor value model was supported as the CFA model fit was good: $\chi^2(732) = 1719.01$ ($p < .001$), RSMEA = .08, TLI = .91, CFI = .92. All factor loadings were significant at $p < .06$, and 86% of the (within-group standardized) factor loadings were above .50, with an average factor loading of .68. All factor correlations were significantly below unity ($p < .001$), supporting discriminant validity between the constructs (Anderson and Gerbing, 1988). After constraining the matrix of factor loadings to be invariant across the four age groups, the following fit measures were obtained: $\chi^2(783) = 1786.67$ ($p < .001$), RSMEA = .08, TLI = .91, CFI = .92. The increase in chi-square value between the model of configural invariance and metric invariance is significant ($\Delta\chi^2(51) = 67.66$, $p < .06$), which is not unexpected (Steenkamp and Van Trijp, 1991). All other measures remained the same, however. Hence, equality of factor loadings was also supported.

Configural invariance was also obtained for the product specific variables. The fit of the CFA model was good: $\chi^2(1596) = 4007.45$ ($p < .001$), RSMEA = .09, TLI = .94, CFI = .94. All factor loadings were significant at $p < .001$, and 97% was above .50, with an average of .73. All factor correlations were significantly below unity ($p < .001$), supporting discriminant validity between the constructs (Anderson and Gerbing, 1988). Metric invariance was also supported: $\chi^2(1674) = 4191.28$ ($p < .001$), RSMEA = .09, TLI = .94, CFI = .94.

Accordingly, the cross-age group invariance of the measures was supported. The good model fit and the significant factor loadings further support the unidimensionality and convergent validity of the constructs (Anderson and Gerbing, 1988). Items were averaged for each scale to obtain composite scores for the various constructs. Mean values of key constructs are provided in table 5.3. Given that metric invariance is established, we can now validly estimate the structural relations between the constructs and test the hypotheses in a multiple age group setting (Steenkamp and Baumgartner, 1998).

5.5.3 Descriptives

Table 5.3 shows the mean values and standard deviations for the constructs included in our proposed framework¹. ANOVA with multiple comparisons (LSD) has been carried out to indicate to what extent consumers of different ages diverge in their intensity of these constructs.

The eldest age group (56 to 70) has a significantly higher purchase intention than the other age groups ($F(1,792) = 5.79, p < .05$). The youngest age group (25 to 34) has the least intense negative affect, and the 45 to 56 age group has the most intense negative affect ($F(1,792) = 3.31, p < .05$). The two younger groups experience more positive affect than the two older groups ($F(1,792) = 2.11, p < .10$). This indicates that the youngest group (25 to 34) has the most intense net positive emotions and the 45 to 56 age group the most negative. Surprisingly, however, the youngest group has the lowest purchase intention. It is therefore of key importance to investigate how these constructs are related for the different age groups.

Perceived relative advantage seems to increase with age, but no significant differences between the four age groups were found ($F(1,792) = 1.56, n.s.$). Also there are no perceived differences in the taste of the functional food products between the age groups ($F(1,792) = .43, n.s.$). The 45 to 56 age group has the lowest confidence in the benefit of the functional food product, and the 57 to 70 age group has the highest confidence in the benefit ($F(1,792) = 2.16, p < .10$). Ability to purchase and perceived novelty of addition increase with age ($F(1,792) = 4.55, p < .05$ and $F(1,792) = 3.75, p < .05$, resp.).

There are no differences in novelty proneness and price consciousness among the age groups ($F(1,792) = 1.75, n.s.$ and $F(1,792) = 1.10, n.s.$, resp.). The importance of health increases over age ($F(1,792) = 39.49, p < .05$), whereas the importance of convenience decreases over age ($F(1,792) = 27.43, p < .05$).

¹ Note that items were mean-centered per functional food product types, yielding a mean of approximately zero for all consumers.

Table 5.3. Group differences for purchase intention, emotions, functional food product evaluations, and food-related lifestyle values

Variables	25 to 34 years old		35 to 44 years old		45 to 56 years old		57 to 70 years old		F-value
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	
<i>Purchase intention</i>	-.17 ^a	1.16	-.06 ^a	1.09	-.04 ^a	1.07	.28 ^b	1.10	5.79**
<i>Emotions</i>									
Negative affect	-.08 ^a	.46	.01 ^{bc}	.57	.08 ^b	.62	-.02 ^{ac}	.53	3.31**
Positive affect	.08 ^a	.89	.09 ^a	.99	-.09 ^b	.81	-.05 ^{ab}	.83	2.11*
<i>Functional food product evaluations</i>									
Perceived relative advantage	-.07 ^a	1.43	-.11 ^a	1.37	-.02 ^{ab}	1.51	.19 ^b	1.54	1.56
Taste	.02 ^a	1.36	.04 ^a	1.28	-.09 ^a	1.34	.05 ^a	1.42	.43
Confidence in claim	.01 ^{ab}	1.27	-.10 ^{ab}	1.23	-.18 ^a	1.33	.13 ^b	1.32	2.16*
Ability to purchase	-.27 ^a	1.59	-.10 ^{ab}	1.50	.07 ^{bc}	1.60	.30 ^c	1.59	4.55**
Novelty of addition	-.22 ^a	1.51	.01 ^a	1.53	-.07 ^a	1.63	.31 ^b	1.70	3.75**
<i>Food-related lifestyle values</i>									
Novelty proneness	.00 ^{ab}	1.00	.12 ^a	1.06	.00 ^{ab}	1.17	-.09 ^b	1.07	1.10
Importance of health	-.61 ^a	1.06	-.10 ^b	1.11	.15 ^c	1.14	.56 ^d	1.02	39.49**
Importance of convenience	.52 ^a	1.14	.19 ^b	1.13	-.22 ^c	1.19	-.46 ^d	1.17	27.43**
Price consciousness	-.09 ^a	1.05	-.11 ^a	1.17	.06 ^{ab}	1.31	.13 ^b	1.16	1.75

Note: Different superscripts reflect a significant difference of the intensity at a p-value < 0.05 (one-sided)

** p < .05

* p < .10

5.5.4 Test of hypotheses

Structural equation modeling was used to test the hypotheses. The relatively small sample size for each group (between 177 and 226 respondents) and the large number of items (56 in total) required that each latent variable be measured by a single indicator variable (“data parcel”). This single indicator variable was constructed by taking the mean of the items for each scale and fixing the error variance at a level appropriate to its coefficient alpha reliability (Anderson and Gerbing, 1988). Data parceling was chosen as it results in less biased estimates of structural parameters and better fitting solutions, when items have a unidimensional structure (Bandalos, 2002; Little et al., 2002; see Steenkamp et al., 2003 for similar practice). The paths between the single indicators and latent variables were set to one so that the variance of the latent constructs could be freely estimated. The model with all 793 respondents had a reasonable fit: $\chi^2(41) = 345.21$ ($p < .001$), RSMEA = .10, TLI = .81, CFI = .88.

5.5.5 Main effects

The unstandardized parameter estimates for the model with main effects are included in table 5.4.

H1 posits a negative relation between the negative affect of consumers and their purchase intention of the functional food product. This hypothesis is supported ($\beta = -.25$, $t = -4.05$). Consistent with H2, positive affect was found to be positively associated with the purchase intention of the functional food product ($\beta = .14$, $t = 3.31$).

Perceived relative advantage has a positive relation with consumers’ purchase intention ($\beta = .57$, $t = 17.07$), thereby supporting H3. Consistent with H4, taste of the functional food product was found to be positively associated with purchase intention ($\beta = .06$, $t = 2.92$). As hypothesized (H5, H6, and H7), the consumer’s confidence in the benefit has a negative association with his negative affect ($\beta = -.16$, $t = -10.36$), and a positive relation with his positive affect ($\beta = .41$, $t = 18.35$) and perceived relative advantage ($\beta = .84$, $t = 21.83$). H8 proposes a negative association between perceived ability to purchase a functional food product and negative affect, but this relationship was close to zero and nonsignificant ($\beta = -.02$, $t = -.77$).

Table 5.4. Model with main effects (unstandardized results with t-values)

	Relation	Expected direction	Unstandardized coefficient	t-value	Hypothesis accepted?
H1	Negative affect → Purchase intention	-	-.25	-4.05**	Yes
H2	Positive affect → Purchase intention	+	.14	3.31**	Yes
H3	Relative advantage → Purchase intention	+	.57	17.07**	Yes
H4	Taste → Purchase intention	+	.06	2.92**	Yes
H5	Confidence in benefit → Negative affect	-	-.16	-10.36**	Yes
H6	Confidence in benefit → Positive affect	+	.41	18.35**	Yes
H7	Confidence in benefit → Relative advantage	+	.84	21.83**	Yes
H8	Ability → Negative affect	-	-.02	-.77	No
H9	Novelty of addition → Negative affect	+	.03	2.49**	Yes
H10	Novelty of addition → Positive affect	-	-.02	-1.21	No
H11	Novelty → Confidence in benefit	+	-.17	-3.11**	No
H12	Novelty → Novelty of addition	-	.03	.43	No
H13	Health → Relative advantage	+	.09	1.66	No
H14	Health → Confidence in benefit	+	.33	4.45**	Yes
H15	Convenience → Relative advantage	+	.06	.79	No
H16	Convenience → Taste	+	.27	4.03**	Yes
H17	Convenience → Confidence in benefit	+	.65	6.72**	Yes
H18	Convenience → Ability	+	.07	.82	No
H19	Price → Ability	-	-.30	-5.27**	Yes

** p < .05

* p < .10

The relationship between novelty of the addition and negative affect was found to be positive and significant ($\beta = .03$, $t = 2.49$). H9 is therefore supported. H10 is rejected, as the proposed negative relationship between novelty of the addition and positive affect was in the expected direction, but nonsignificant ($\beta = -.02$, $t = -1.21$).

Contrary to our expectations (H11), the novelty proneness of consumers has a negative association with their confidence in the benefit ($\gamma = -.17$, $t = -3.11$). H12 posits a positive relation between the novelty proneness of consumers and the extent to which they consider the addition to the product novel, but this relationship was nonsignificant ($\gamma = .03$, $t = .43$). Contrary to our expectations (H13), the importance of health has no influence on the perceived relative advantage of the health food product ($\gamma = .09$, $t = 1.66$). H13 is therefore rejected. H14 proposes a positive association between the importance of health and the confidence in the benefit ($\gamma = .33$, $t = 4.45$), and is supported. We hypothesized a positive relation between importance of convenience and perceived relative advantage (H15), but this relationship was close to zero and nonsignificant ($\gamma = .06$, $t = .79$). As expected (H16), a positive relation between importance of convenience and taste was observed ($\gamma = .27$, $t = 4.03$). Consistent with H17, the importance of convenience was found to be positively associated with the confidence in the benefit ($\gamma = .65$, $t = 6.72$). We hypothesized a positive relation between importance of convenience and ability to purchase the functional food product (H18), but this relationship was close to zero and nonsignificant ($\gamma = .07$, $t = .82$). Price consciousness for food products was found to have a negative effect on the perceived ability to purchase a functional food product ($\gamma = -.30$, $t = -5.27$). This supports H19.

5.5.6 Moderating effects of age

We tested the moderating effects of age through multi-group analyses (Stone and Hollenbeck, 1989, see for an application: De Wulf et al., 2001). The subsamples consisted of the four different age groups. To test for the moderating influence of age, we constrained all paths of the structural model to be equal for the subsamples. Next we estimated effect for effect by freeing each time one path that we hypothesized as being influenced by the moderator. The difference in chi-square value between models shows whether age operates as a moderator. If the chi-square value (with three degrees of freedom) decreases significantly from the constrained model to a model in which one relationship is set free, this means that age moderates that relationship. The

LISREL estimates (unstandardized parameter estimates) for the model with all effects for the four generations are shown in table 5.5.

Contrary to our expectations (H20), the relationship between negative affect and purchase intention did not differ across age groups. Hence, H20 is rejected. Also no differences were found for the positive relation between positive affect and purchase intention. As a result H21 is rejected.

H22 posits a strengthening in the relation between perceived relative advantage and purchase intention when age increases. The chi-square value does indicate differences across the age groups, but not in the expected direction. Especially for the youngest age group perceived relative advantage has a strong influence on purchase intention, compared to the other age groups. H22 is therefore rejected. The effect of taste for the purchase intention was hypothesized (H23) to become weaker for older age groups. Taste, however, only has a significant effect for the consumers between 34 and 45 years old. H23 is therefore rejected.

We hypothesized an increase in the strength of the relationship between confidence in the benefit of the functional food product and negative affect (H24a), positive affect (H24b), and perceived relative advantage (H24c) when age increases. No differences were found for these relations across the four age groups. Hence, H24a, H24b and H24c are rejected. H25 proposes that the strength of the relation between ability to purchase a functional food product and negative affect varies across age groups according to a U-shaped form, but the results indicate the opposite. Only for the consumers between 35 and 44 years old this negative relation is significant and different from the other age groups. H25 is therefore rejected. H26a posits that the positive effect of perceived novelty of the health addition on negative affect will be stronger when age increases. The chi-square value indicates no difference, however. Hence H26a is rejected. Contrary to H26b, there are no significant relations between perceived novelty of the health addition and positive affect, hence also no differences across the age groups.

In line with our expectations (H27a), the relationship between novelty proneness and confidence in the benefit is the strongest for the youngest age group. As a result H27a is supported. H27b posits that age has a strengthening influence on the relationship between novelty proneness and perceived novelty of the health addition. This hypothesis is not supported, as there are no differences between the four age groups.

Table 5.5. Model with interaction effects (unstandardized coefficients (t-value between brackets))

H	Relation	Expected influence of age	25 to 34	35 to 44	45 to 56	57 to 70	$\chi^2(3)$	H accepted?
H20	Negative affect → Purchase intention	↑	-.25 (-4.15**)	-.25 (-4.15**)	-.25 (-4.15**)	-.25 (-4.15**)	.11	No
H21	Positive affect → Purchase intention	↑	.14 (3.53**)	.14 (3.53**)	.14 (3.53**)	.14 (3.53**)	-1.06	No
H22	Relative advantage → Purchase intention	↑	.64 (10.91**)	.55 (9.44**)	.50 (9.74**)	.58 (10.89**)	6.43*	No
H23	Taste → Purchase intention	↓	.04 (.93)	.17 (3.92**)	.03 (.71)	.03 (.72)	5.44*	No
H24a	Confidence in benefit → Negative affect	↑	-.16 (-10.11**)	-.16 (-10.11**)	-.16 (-10.11**)	-.16 (-10.11**)	2.04	No
H24b	Confidence in benefit → Positive affect	↑	.41 (18.66**)	.41 (18.66**)	.41 (18.66**)	.41 (18.66**)	1.91	No
H24c	Confidence in benefit → Relative advantage	↑	.84 (20.55**)	.84 (20.55**)	.84 (20.55**)	.84 (20.55**)	.14	No
H25	Ability → Negative affect	U	.05 (1.55)	-.20 (-3.20**)	.02 (.31)	-.05 (-1.06)	15.02**	No
H26a	Novelty of addition → Negative affect	↑	.02 (2.06**)	.02 (2.06**)	.02 (2.06**)	.02 (2.06**)	1.06	No
H26b	Novelty of addition → Positive affect	↑	-.02 (-1.05)	-.02 (-1.05)	.02 (-1.05)	-.02 (-1.05)	1.03	No
H27a	Novelty → Confidence in benefit	↓	-.29 (-2.63**)	-.06 (-.61)	-.15 (-1.68*)	-.16 (-1.53)	3.12*	Yes
H27b	Novelty → Novelty of addition	↓	.03 (.54)	.03 (.54)	.03 (.54)	.03 (.54)	.03	No
H28a	Health → Relative advantage	↑	.16 (1.82*)	.10 (1.19)	.10 (1.19)	-.18 (-1.82*)	7.79**	No
H28b	Health → Confidence in benefit	↑	.32 (4.30**)	.32 (4.30**)	.32 (4.30**)	.32 (4.30**)	1.13	No
H29a	Convenience → Relative advantage	U	.06 (.65)	.06 (.65)	.06 (.65)	.06 (.65)	1.08	No
H29b	Convenience → Confidence in benefit	U	.90 (4.73**)	.56 (2.81**)	.95 (5.78**)	.74 (4.58**)	6.08*	Partially
H29c	Convenience → Ability	U	.31 (3.40**)	.31 (3.40**)	.31 (3.40**)	.31 (3.40**)	1.27	No
H29d	Convenience → Taste	↓	.39 (5.00**)	.39 (5.00**)	.39 (5.00**)	.39 (5.00**)	2.23	No
H30	Price → Ability	U	-.51 (-4.00**)	-.39 (-3.63**)	-.22 (-2.46**)	-.06 (-.50)	5.43*	No

Note: Different letters reflect a significant difference of the intensity at a p-value < 0.05 (one-sided)

** p < .05

* p < .10

↑ Effect becomes stronger with age

↓ Effect becomes weaker with age

U Effect is strongest for youngest and eldest consumers (compared to middle age consumers)

We hypothesized that age would strengthen the relation between health and perceived relative advantage (H28a) and confidence in the benefit (H28b). For consumers between the ages of 25 and 34 we notice a positive relation between health and personal relevance, whereas for the age group 57 to 70 this relation is negative. This means that for consumers between 25 and 34 functional food products *are* related to health, whereas for the 57 to 70 age group they *are not*. H28a is thus rejected. Because there are no differences in the influence of health on confidence in the benefit, H28b is rejected. The strength of the relation between convenience and perceived relative advantage (H29a), confidence in the benefit (H29b), and ability to purchase a functional food product (H29c) was expected to vary across age groups according to a U-shape. Yet there are no significant effects for all age groups for the relation between convenience and perceived relative advantage. Hence H29a is rejected. The relation between convenience and confidence in the benefit is strongest for the age groups 25 to 34 and 45 to 56, weaker for the consumers between 57 and 70, and is nonsignificant for consumers between 35 and 44. H29b is therefore partially supported. The chi-square value shows no difference for the relation between convenience and perceived ability to purchase. H29c is thus rejected. Because there are no differences for the influence of convenience on taste, H29d is rejected. H30 proposes that the relationship between price consciousness and perceived ability to purchase the functional food product varies across age groups according to a U-shaped form, but this is not supported. The strength of the relation seems to decrease with age, and is for the 57 to 70 age group even insignificant.

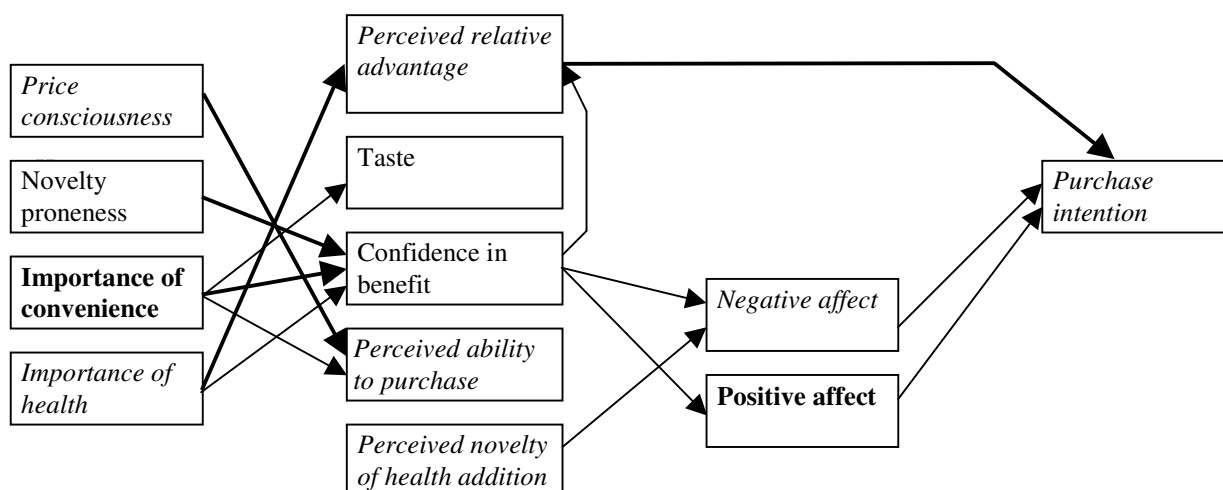
5.6 DISCUSSION

This study expands our understanding of consumers' emotions and purchase intention regarding functional food products. Our framework included food-related lifestyle values, functional food product evaluations, emotions, and purchase intention. We developed a number of hypotheses to test this framework and the moderating role of age. The fact that these hypotheses were tested in a large sample of Dutch respondents – that are responsible for at least 50% of their households' grocery shopping – involving four different functional food products, increases the generalizability of our results. Support was found for many hypotheses.

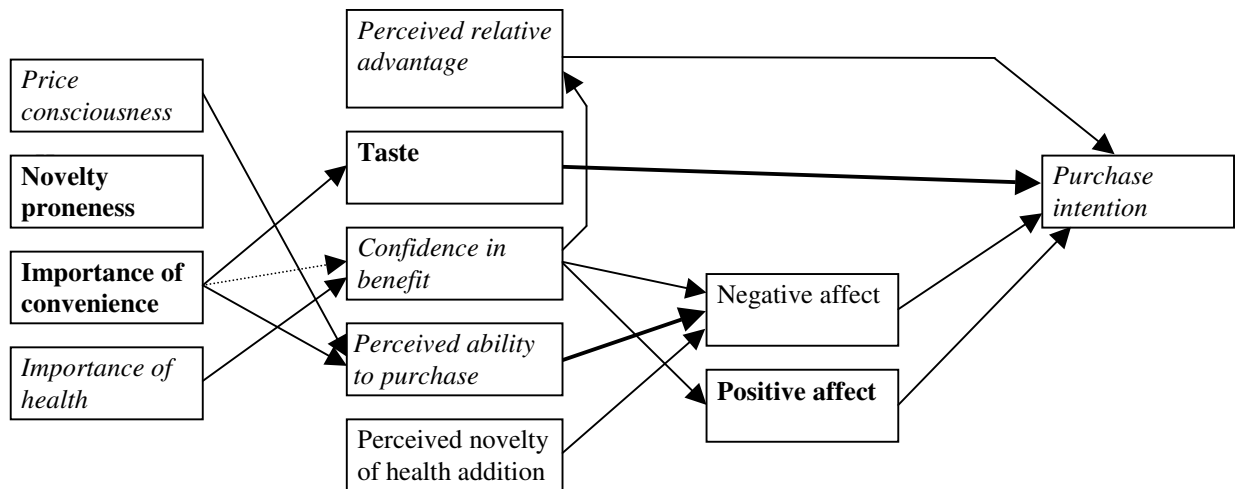
In the model with the main relationships evidence was found for the significant influence of negative affect, positive affect, perceived relative advantage and taste on consumers' purchase intention. Confidence in the benefit was shown to have a negative influence on negative affect, and a positive influence on positive affect and perceived relative advantage. Perceived novelty of the health addition increases the negative emotions associated with the functional food product. Price consciousness has a negative influence on the perceived ability to purchase the functional food product. Surprisingly, consumers that are more open to new products are less likely to believe in the benefit of the functional food product instead of more. Liking to try new food products thus does not necessarily extend to novel health additions to functional food products. Consumers that consider convenience as more important have more confidence in the benefit and sooner deem the taste of the functional food product to be at least as good as that of a conventional food product. In addition, consumers that find health more important have more trust in the benefit. Yet when looking at these relations per age group, some crucial differences are revealed. Note that even though most hypotheses were rejected, this does not mean that there are no differences between ages, but rather that the differences were not in the expected direction. We estimated a 'trimmed' model where only the significant differences were retained. This multi-group model with four age groups had a reasonable fit: $\chi^2(200) = 491.12$ ($p < .001$), RSMEA = .09, TLI = .85, CFI = .89 and is shown in figure 5.2.

Figure 5.2. Outcomes per age group

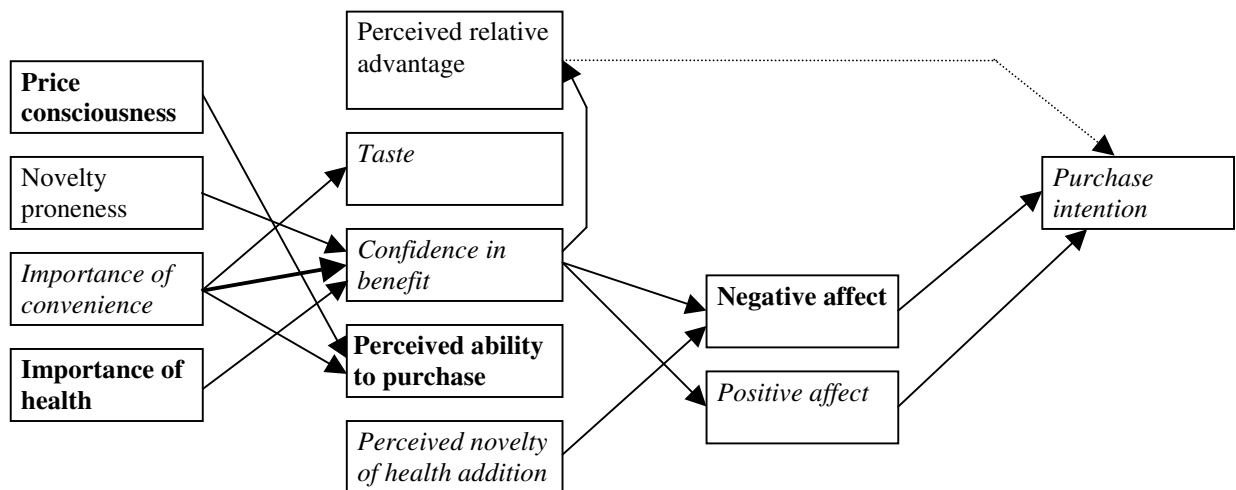
Age group: 25 to 34 years old:



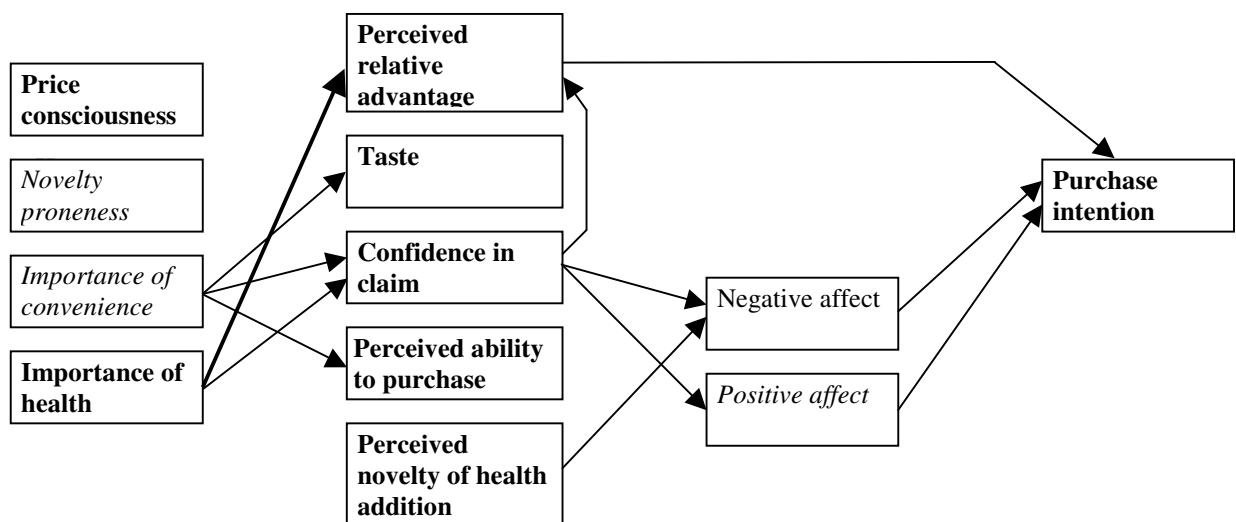
Age group: 35 to 44 years old:



Age group: 45 to 56 years old:



Age group: 57 to 70 years old:



Note: In *italics*: variable has a relatively low score and **bold**: variable has a relatively high score (based on table 5.3). Dotted line: effect is relatively weaker and **bold** line: effect is relatively stronger (based on table 5.5).

The 25 to 34 age group associates the lowest advantage with functional food products, and the 57 to 70 age groups the highest. Despite these differences, their perceived relative advantage has a similar strong impact on their purchase intention. For the consumers between 45 and 56, who attach moderate advantage to functional food products, their perceived relative advantage has the smallest influence on purchase intention.

There are no differences in the taste associated with functional food products, but only for the group between 35 and 44 years old this variable has a significant positive influence on their purchase intention.

Even though consumers between 25 and 34 think that they have a very low ability to purchase functional food products, this has no influence on their negative affect. Also for the eldest consumers, who have the feeling that they can easily purchase a functional food product, this ability does not impact their negative affect. Consumers between 35 and 44, however, perceive themselves to be moderately able to purchase a functional food product compared to the other age groups. Yet when they think that they cannot purchase the functional food product they will experience more negative affect.

Even though consumers between 57 and 70 have the highest price consciousness of all age groups, this has no influence on their perceived ability to purchase a functional food product. For the other age groups their price consciousness does have an important influence on their perceived ability to purchase a functional food product. Especially the consumers younger than 44 are relatively not price conscious. Yet when they are, this has an important impact on their perceived ability to purchase a functional food product.

For the relatively extremely novelty prone or novelty avoiding consumers (age groups 35 to 44 and 57 to 70, respectively) their novelty proneness does not play a role in their confidence in the benefit of the functional food product. The other two age groups (25 to 34 and 45 to 56) are relatively moderate in their novelty proneness, but for them this value does have a negative influence on their confidence in the benefit.

The consumers between 45 and 56 years old are relatively less convenience oriented and the consumers between 25 and 34 are most convenience oriented, but for these age groups their level of convenience has the strongest positive influence on their confidence in the benefit. Even though consumers of the 34 to 45 age group

value convenience quite highly, this does not have such a strong influence on their confidence in the benefit.

Consumers of the 25 to 34 age group consider health to be relatively unimportant, but when they do their health consciousness has a positive influence on the perceived relative advantage associated with the functional food product. For consumers between 57 and 70 their health is very important to them, but their health consciousness has a negative influence on the perceived relative advantage of a functional food product.

In summary, our findings provide broad support for the framework and the relevance of including age as a moderating variable. The findings of this study also underline the important role of emotions in the purchase intention of functional food products. Thus, combining age and a value-evaluation-emotions-behavior framework enhanced our understanding of consumers' thoughts and feelings with respect to functional food products. These findings are important from a theoretical viewpoint because they may help understand why certain effects can be found in some studies and not in others. It is also important from an applied perspective, because our Western society is growing older and firms need to understand that consumers of different ages require a different approach (Moschis, 1994).

5.6.1 Implications

We aim at providing a more fundamental understanding of why certain consumers think about functional food products the way they do. Within a general conceptual framework, we identified consumer values and product attributes related to the emotions and purchase intention of functional food products. Furthermore, we showed that age is a crucial moderator. For example, health consciousness causes consumers between the age of 25 and 34 to consider functional food products as having more relative advantage, whereas for consumers between 57 and 70 years old their health consciousness makes them think of functional food products as having less relative advantage. Possibly for older generations health in a food product cannot coincide with artificially engineered additions, whereas young consumers embrace health additions, no matter how they got into the food product.

Our general findings also generate relevant insights that are more directly applicable by marketing managers. For all consumers their perceived relative advantage plays a crucial role in their decision to purchase a functional food product,

and this is heavily influenced by their general belief in the benefit of the functional food product. Moreover, the confidence in the benefit of the functional food product has been shown to have an important indirect effect on purchase intention via negative affect, positive affect and perceived relative advantage for all consumers. Yet there are crucial differences between consumers of different ages. Simply “throwing” them all together would thus result in the wrong marketing strategies. Marketing managers should in particular consider the following:

Young consumers (between 25 and 34) will especially have to be convinced of the (personal) advantage of functional food products. At this moment they seem to be the least likely target group, yet appealing to values like convenience and especially health might create more faith in the benefit and relative advantage associated with the functional food product.

Consumers between 35 and 44 are more hedonistic, and thus, apart from convincing them about the personal relevance of the functional food product, the taste should be good. For these consumers functional food products become more attractive when they are familiar, but these consumers have more negative emotions when they have the feeling that they cannot purchase the functional food product. Marketing managers could for example advertise with “value for money”, because even though their purchase ability has a strong negative influence, compared to the other age groups they do not rate themselves as the least able to purchase a functional food product.

Consumers between 45 and 56 have the most intense negative emotions compared to the other age groups. By focusing on health, familiarity and especially convenience their confidence in the benefit grows larger and as a result their positive affect increases and their negative affect decreases. For these consumers the perceived relative advantage has the smallest influence on purchase intention compared to the other age groups. Hence, the focus should be on their confidence in the benefit to reduce their strong negative emotions.

Older consumers (between 57 and 70) attach a lot of importance to their health and this has a negative influence on the advantage attached to the functional food product. Considering their relatively weak emotions and strong influence of perceived relative advantage on their purchase intention, it will be important to change their perception that health and functional food products are inversely related. For this

group the focus should be on the positive implications of functional food products on their health and convenience.

When introducing and marketing functional food products, these issues and different appeals should be considered. Also some functional food products might be more suitable for certain age groups than others. Our model can thus also be used for target market selection. Until now especially older consumers seemed to accept functional food products, but this study has helped to reveal what is important for other age groups and how they can be addressed.

Health is a society-wide trend and all consumers seem to be dealing with it one way or another (Gilbert, 2000). Some consumers feel more comfortable about changing their diet or eating for example more organic food products. Especially younger consumers watch for fat and calorie content of food products (Oakes, 2003). Functional food products could be the answer to this health trend, but it is important to know how to approach the different age groups that all have different values and ideas about what is healthy.

5.6.2 Limitations and Directions for Future Research

As with any study, this study has several limitations, which present opportunities for further research. Firstly, there are several ways to expand our conceptual framework. The food-related lifestyle values mediate general values and product evaluations (Brunso and Grunert, 1998). General values could therefore be included as antecedents of the food-related lifestyle values to provide a more in-depth background of the evaluations and emotions of consumers. In this research we highlighted only one aspect of consumers by focusing on food values. With the use of scanner data it would be possible to include, for example, the food behavior of consumers to add more insight. In addition, we focused on the age of consumers, but it would also be interesting to include other socio-demographics. This has not been done to avoid overburdening the present model, and because previous research has shown the essential role of age (e.g., Poulsen, 1999; Schiffman, 1997; Verbeke, 2005).

Secondly, future research could link our findings to previous research on processing differences between age groups (e.g., Cole and Balasubramanian, 1993; Yoon, 1997). This would create a clearer picture on *how* to communicate *what* to the right age group in the right way. Also, future research could investigate what would

be the best way to communicate the health claim on the package of functional food products (see also, Van Kleef et al., 2005).

Thirdly, different approaches to our model are possible: by using more or different functional food product types, by applying a different division of the age groups, or by using cognitive age instead of chronological age (Gregoire et al., 2003).

Fourthly, new trends regarding food products are always emerging. The latest trend is already a big hit in Asia and slowly emerging in Europe: beauty food products (Adformatie, 2002). These products have cosmetic significance, thereby appealing to different values than functional food products. This requires further investigation.

In sum, much remains to be done. It is hoped that this study stimulates more research on consumer behavior with respect to functional foods.

CHAPTER 6

CONCLUSIONS

6.1 OUTCOMES OF THIS DISSERTATION

In this dissertation I have shed light on the role and importance of consumer emotions in relation to novel food products. These are food products created by means of a high level of technical manipulation and are expected to generate strong emotions among consumers. Chapter 1 introduced this topic and gave an overview of the dissertation.

In chapter 2, I combined different research streams and built a hierarchical consumer emotions model consisting of three levels of abstractness. At the highest level of abstractness, this model consists of negative and positive affect. These are also the most frequently encountered dimensions in the emotion literature. Four negative and four positive basic emotions constitute the intermediate level and specific consumer emotions make up the lowest level. The latter are based on the Consumption Emotion Set (Richins, 1997). Next I successfully tested this model, and compared the two most abstract levels for different types of food. The results suggest that the basic emotions allow for a better understanding of the consumers' feelings with respect to novel food products than only positive and negative affect.

Chapter 3 showed an overview of the fear appeals related to genetically modified food that appeared in the media. Next I validated a scale to measure consumers' fear of genetically modified food. The results show that Dutch consumers feel indeed significantly more fearful of genetically modified food than of other novel food types such as, for example, functional food. I found no strong relationship between consumers' socio-demographic make-up and fear of genetically modified food. This indicates that fear of this technologically novel type of food is an emotion that applies to the whole society. I further developed and tested a conceptual model of key antecedents and consequences of fear of genetically modified food. Fear of genetically modified food is positively influenced by consumers' concern for the environment and negatively affected by their faith in technology. Consumers who are

more fearful of genetically modified food have a more negative attitude toward genetically modified food in general and toward genetic modification of animals, and exhibit a greater interest in information related to food production and genetic modification.

In chapter 4 I explored the influence of consumers' emotions and beliefs on their responses to genetically modified food. These responses consist of the consumer's attitude, purchase intention, decision to delay, negative word-of-mouth and intention to complain. After estimating the main model I divided the respondents into two groups: low versus high on perceived knowledge about genetically modified food. I expected the understanding about the novel food product to be a crucial issue in the evaluation of these products, and I showed that consumers low on perceived knowledge indeed rely less on their net cognition to construct their responses than consumers high on perceived knowledge. Negative and positive affect had an important impact on consumers' responses for both knowledge groups. In addition, I found that the perceived knowledge level does not influence the intensity of the perception of control or trust in science and technology. Rather, for consumers low on perceived knowledge these perceptions have a smaller influence on their net cognition than for consumers high on perceived knowledge.

Chapter 5 examined the antecedents of the emotions and purchase intention for functional food products. In order to investigate how consumers arrive at their purchase decision, the proposed framework contains food-related lifestyle values, functional food product evaluations and emotions. Consumers were divided into four groups ranging from young (25 to 34 years old) to old (57 to 70 years old), with two groups in between (35 to 44 years old and 45 to 56 years old). Even though there are differences in the intensity of the emotions across the age groups, I found no differences in respect to the relationship of negative and positive affect with purchase intention. Furthermore, the values *health* and *convenience* are especially important in the evaluation of a functional food product. Of these functional food product evaluations the most significant ones were *relative advantage* and *confidence in the benefit*. Notable effects were the following. Once the consumers between 25 and 34 years old are convinced about the relative advantage of the functional food product they had a higher purchase intention than the other age groups. Taste only had an impact on purchase intention for the 35 to 44 age group. Perceived relative advantage had the smallest influence on purchase intention for the 45 to 56 age group.

Consequently, their strong negative emotions weigh relatively heavier than for the other age groups. For the eldest age group the results showed that when they found their health important, they associated fewer relative advantages with a functional food product. This indicates that the link between functional food products and health is negative for these consumers, while functional food products are intended to be good for one's health.

6.2 CONTRIBUTIONS TO RESEARCH

Based on my dissertation I identify several key areas in consumer research. These are the dimensions of consumer emotions, the measurement of consumer emotions, the use of consumer emotions, and consumer emotions and novel food products. For each of these areas I address the contribution of my dissertation, and I go beyond the specific points for further research at the end of the empirical chapters and present suggestions for future research for these key areas. An overview is presented in table 6.1.

Dimensions of consumer research

A consumer emotion is an affective and subjective reaction to a product or service. This indicates the following: First, this consumer emotion can be the result of a cognitive evaluation, but this is not necessarily the case (see Zajonc, 1980b). Second, a consumer's emotion is a personal evaluation of a given product or service (Frijda, 1988). This means that different consumers can experience different emotions when evaluating a similar product or service. Third, this reaction has a large impact on the responses of consumers to this product or service (Bagozzi et al, 1999).

In addition, I propose that a consumer emotion has a certain level of abstractness depending on the consumer, the product¹ in question and the interaction between these two. When a consumer has not actively thought about the product, he (or she) will feel the most abstract emotions, namely negative and/or positive affect (Berkowitz, 2000). When consumers have carefully considered the product they will

¹ At all the places where "a product" is mentioned, this can be replaced by "a service", since these are of course also situations that a consumer is confronted with.

Table 6.1. Contributions to research

Key areas	Contributions	Suggestions for future research
Dimensions of consumer emotions	Consumer emotions can be defined in terms of their level of abstractness.	Future research could focus on: <ul style="list-style-type: none">• the causes and consequences of the level of abstractness of consumer emotions;• the development over time of consumer emotions by means of longitudinal research.
Measurement of consumer emotions	Depending on the research setting, include: <ul style="list-style-type: none">• a limited number of consumer emotions per valence;• relevant consumer emotions.	Future research could focus on: <ul style="list-style-type: none">• improving the measurement of consumer emotions in a questionnaire format.
Use of consumer emotions	Emotions have an impact on behavior, over and above the influence of risks and benefits. When different consumers are confronted with the same product this results in different experiences and effects of consumer emotions.	Future research could focus on: <ul style="list-style-type: none">• age differences;• differences in the influence of consumer emotions on responses to novel food products;• cultural differences.
Consumer emotions and novel food products	Consumer emotions are essential in the analysis of novel food products. For specific novel food products specific frameworks should be created.	Future research could focus on: <ul style="list-style-type: none">• other novel food products;• packaging of novel food products;• pricing and its relation to consumer emotions;• cross-effects between novel food products and other food products

be able to construct specific cognitive evaluations and as a consequence basic or even specific emotions (Berkowitz, 2000).

Several factors influence the consideration of a product and thus the level of abstractness at which consumers experience their emotions. The most important ones are the consumer's *ability* and *interest*. For example, a consumer may not be able to process the features of the product because of lack of time, or because the product has only been on the market for a short time. Another reason can be a lack of available resources (see for an application, Shiv and Fedorikhin, 1999). Furthermore, whether or not a consumer evaluates a product intensively largely depends on his (or her) own interest or involvement (Frijda, 1988). When a consumer is not motivated to give consideration to a product, no specific "action tendencies" can be created (Frijda, 1988). As a consequence, he (or she) will only have unclearly defined negative and/or positive feelings toward the product. The level of abstractness is thus an important dimension of consumer emotions.

Future research could investigate more specifically which factors influence the level of abstractness, and how consumers with more abstract emotions differ from consumers with less abstract emotions. Another worthy topic is how consumers themselves would indicate the level of abstractness of their own emotions.

Yet another important dimension of consumer emotions is the change in emotional responses over time. The research in this dissertation used data that has been collected at one point in time. This cross-sectional data provided a host of information about consumer emotions and their relationship with other variables. However, measuring the experience of emotions for novel food products over time would allow measuring the change in consumer emotions. For example, how does the intensity of emotions change for newly introduced novel food products after the products have been on the market for six months? Measuring consumer emotions in a longitudinal framework would allow for the creation of an "emotion curve", where the development of emotions could be portrayed. Moreover, studying the drivers of the slope of the emotion curve would make it possible to see how, for example, the reduction of negative emotions can be accelerated.

Measurement of consumer emotions

In the research for this dissertation I often encountered low intensity of consumer emotions². I therefore posit two aspects that are to be taken into account when including consumer emotions in applied research settings. The first aspect is that a *limited number of, or preferably one, consumer emotions of the same valence* should be included in the research. I noticed that it is difficult for consumers to fill out answers to questions about specific consumer emotions for certain products. This is because they may not have such specific feelings. For example, not all consumers carefully think about eggs that offer cardiovascular health benefits. As has been shown in chapter 2, specific consumer emotions can be distinguished, but they are often highly related, which increases the chances of multicollinearity in multivariate data analyses. These conclusions are supported by previous research (Scherer and Ceschi, 1997), which showed that when participants are asked questions about many different emotions, a mix of emotions, especially of the same valence, can be expected. This also explains the large number of studies that arrive at positive and negative affect in the marketing literature (see chapter 2): consumers are simply not able to distinguish specific emotions for many consumption products.

The second aspect is that researchers should utilize *emotions words that fit the research setting* and with which consumers feel comfortable. Consumers indicate that they feel almost embarrassed to fill out emotion terms, for they consider it odd to feel “emotional” about, for example, yogurt. It is therefore crucial to use emotion words that actually mean something to the consumer and that are relevant for the research setting. Chapter 2 provides an overview of all the emotion words with the consumer emotion words in italics. Since it is already difficult for some consumers to think about emotions in relation to “regular groceries”, it is crucial to include only the words that make sense. The same applies to the appraisals to measure the evaluations of the product. The origin of the emotion research literature is highly abstract and experimental-oriented work. In chapter 5 I have shown that it is very well possible to translate abstract evaluations into more specific ones that are easily understood by consumers.

² This is not uncommon (Richins, 1997).

Future research could try to improve the measurement of consumer emotions in a questionnaire format. The lexicographic method, as used in this dissertation, is widely employed in the psychological and marketing literature, but I find its use less than optimal. It is especially the case for “normal” products: for a contentious topic like genetically modified food consumers found it less difficult to fill out emotion terms than for fruit juice with extra vitamins. Possible solutions are the use of symbols, pictures, descriptions of emotions instead of emotion words, an explanation of the purpose of the research or examples, or perhaps a more experimental setting with the use of Internet. It would also be interesting to investigate which consumers are more reluctant than others to fill out emotion questionnaires.

Use of consumer emotions

Emotions can fulfill many roles and this is also reflected in the research on consumer emotions, i.e., depending on the research setting consumer emotions are included as independent or dependent variable, or as moderating or intervening variable (see for an overview; Bagozzi et al., 1999). In chapter 4 I showed that emotions have an important impact on responses to novel food products, over and above the influence of risk and benefits, whereas in chapter 5 I positioned consumer emotions between product evaluations and purchase intention in a value-evaluation-emotion-behavior framework. Both studies reflect the importance and usefulness of consumer emotions, whether they are positioned next to beliefs or as a consequence of evaluations.

The versatility of emotions is also reflected in the varying experiences and different roles they play for different consumers (Frijda, 1988). When confronted with a product, (1) different consumers can experience different emotions, (2) depending on their emotions some consumers can feel them more or less intensely than other consumers, and (3) emotions can have a differential influence on their responses to the product in question. It is therefore not only essential to include consumer emotions in the explanation of responses to products (see chapters 3, 4, and 5), but also to distinguish among consumers in their experiences of emotions. The latter has been done in this dissertation by segmenting consumers based on their perceived knowledge (chapter 4) and age (chapter 5). The results showed differences in both the intensity and effect of consumer emotions.

Future research could further investigate the differences between consumers of different ages, for this is a key topic in today's aging society, yet limited research has been conducted in this area. This dissertation showed, for example, that for young consumers their health perception has a positive association with the relative advantage of a functional food product, whereas for older consumers this relationship is negative. A deeper investigation is needed to examine these and other differences.

More research is also necessary to study the differential influences of consumer emotions on responses to products. Which consumer characteristics, other than perceived knowledge, influence whether or not consumers rely on their emotions? In addition, who relies more on their positive emotions versus their negative emotions?

Furthermore, cultural differences between consumers will result in different experiences of consumer emotions, especially with respect to novel food products. The frameworks tested in this dissertation should therefore be replicated in different countries (Steenkamp and Burgess, 2002).

Consumer emotions and novel food products

This dissertation has shown that consumer emotions are essential in the analysis of novel food products. Especially when consumers have no other sources on which to base their responses, or when they believe that their emotions are the most reliable source of information, they will rely more on emotions than beliefs (chapter 4; see also Pham, 1998). Research into novel food products should therefore always include emotions, because especially for these products consumers often do not completely understand how they are produced. This does not mean that the beliefs of consumers should not be investigated, as they proved to play an important role next to the consumer emotions in chapter 4, but that emotions should not be overlooked.

Many novel food products are brought to the market each year and unfortunately many fail. I hope that this dissertation showed that each and every one of them requires a specific framework with its own values and evaluations. The focus for genetically modified food products lies more in environmental and health risks, whereas for functional food products the focus is more on health and convenience benefits. With the expected future interaction between genetically modified food and functional food, i.e., genetically modified food products with consumer health

benefits, these values will need to be combined or others included in order to assess the emotions toward these food products.

Further research in consumer emotions and novel food products is a fruitful and interesting area with a lot of potential. Especially when considering the efforts of biotechnology firms, new research in this area will always be necessary. An example of a novel food type not discussed in this dissertation is beauty food, which provides a beauty benefit (i.e., a smoother skin). The values and beliefs related to this product, and others, will yet again be different from those of genetically modified food and functional food and thus warrant new research.

Considering the importance that consumers attach to the packaging of food products (see chapter 4), future research could focus on how the results of this dissertation can be translated into proper labeling, which at the same time does not scare consumers away by the amount or content of information.

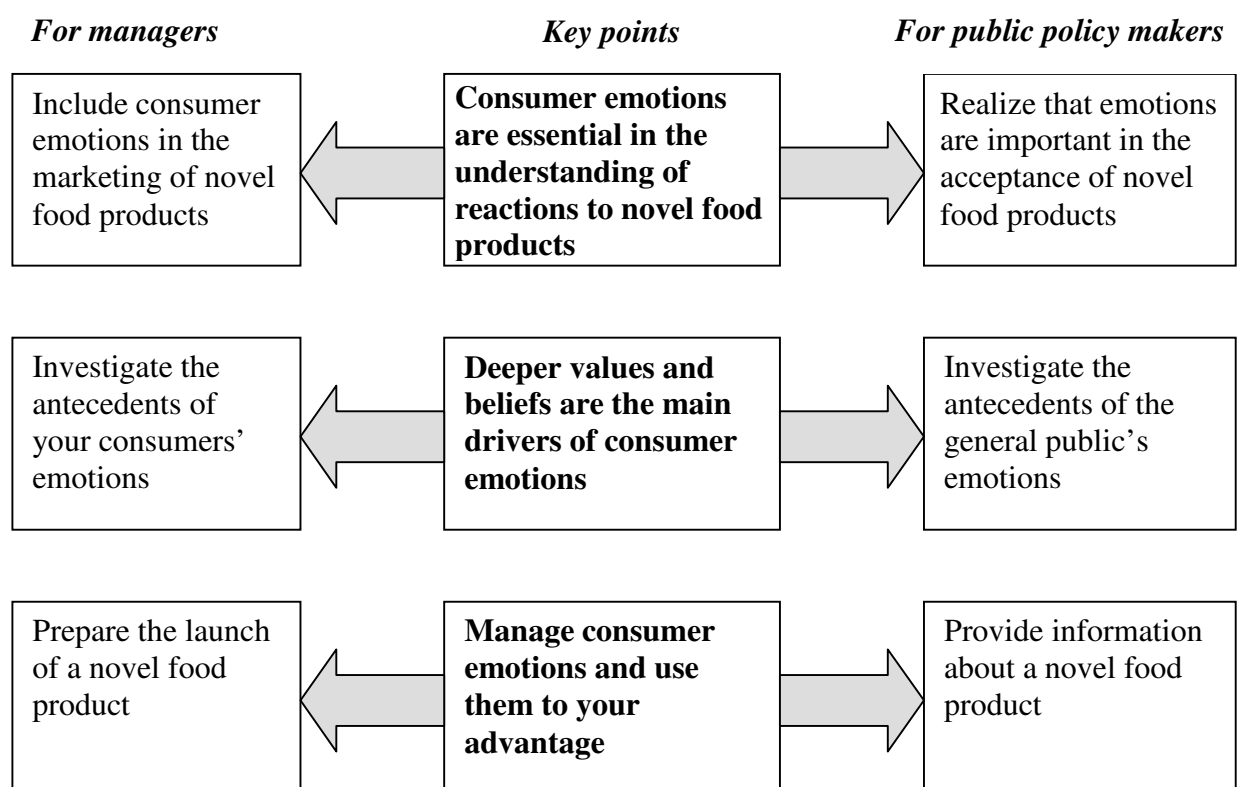
Another aspect of novel food products is their price. Chapter 5 showed that for some consumers, the perceived ability to purchase a product plays an important role in their negative affect. Furthermore, the participants in the interviews about functional food products varied in the importance they attach to price from “it is good for my health, therefore I do not mind the higher price” to “the price is ridiculous” and “it creates classes, because the poor people that actually need it cannot afford it.” Future research could therefore investigate the relationship between price and emotions such as, for example, anger.

Related to the longitudinal research on consumer emotions, is the time-oriented research on novel food products. This will be fruitful in its ability to uncover cross-effects between novel food products and other food products. An example would be an increase in the sales of organic food products that some experts link to the appearance of genetically modified food products on the world market. This implies that the positive emotions associated with organic food increased as a consequence of the negative emotions toward genetically modified food. Future research is needed to test these and similar cross-effects and how they can be related to the positioning of novel food products.

6.3 MANAGERIAL IMPLICATIONS

In this section I address some of the concerns that managers and public policy makers have regarding the emotions toward novel food products. For every key point I will first explain its background and general relevance, after which I will discuss the implications for managers and public policy makers separately. An overview is provided in figure 6.1.

Figure 6.1. Overview of managerial implications



Consumer emotions are essential in the understanding of reactions to novel food products

Consumer emotions can be positive or negative and more or less abstract, but they all have a large impact on the behavior of consumers. In this dissertation I showed the relevance of consumer emotions for two broad novel food product categories: genetically modified food and functional food products. I demonstrated that happy or content consumers have a more positive attitude and higher purchase intention with respect to a novel food product than consumers with less intense

positive emotions (see chapter 5). Negative emotions have a negative influence on a consumer's attitude, purchase intention, and a positive influence on complaining, negative word-of-mouth and the decision to delay purchasing of the novel food product (see chapters 3, 4 and 5). In addition, negative emotions weigh stronger than positive emotions in the construction of consumer responses (see chapters 4 and 5). Moreover, in chapter 4 I show that, independent from risks and benefits, emotions have an impact on consumers' responses. In sum, this dissertation has underlined the significance of consumer emotions with respect to novel food products, for consumers of all ages and with different levels of knowledge.

For managers this means that they need to take the emotions of their consumers into account, because negative consumer emotions will result in negative consumer behavior. They should investigate the emotions of their target market to learn how both their customers and non-customers feel about the novel food product and why. This way negative consumer emotions can be addressed using, for example, advertising campaigns. Specifically, when consumers indicate that they feel fearful toward a novel food product, this means that they experience a lack of control and uncertainty about the possible risk. Consequently, the ad should contain aspects that stress the transparency of the market and the certainty that there is no risk. When consumers have positive emotions about a novel food product, this could be used in advertising campaigns to attract new consumers. Consumer emotions provide managers with a deeper understanding about their novel food products. Managers should thus not only incorporate the beliefs of consumers in order to predict and influence their behavior, but also their emotions.

For public policy makers this indicates that prior to the introduction of food products produced using controversial technology, such as genetically modified food, they should not only consider the objective risk estimates of experts, but also learn from the emotions of the general public. This dissertation has demonstrated that consumers associate mainly negative emotions with genetically modified food products and mainly positive emotions with functional food products. This is reflected in the reactions to these products, because genetically modified food products are outright rejected by the general public whereas the functional food market is booming. Public policy makers should realize that consumer emotions play an important role in

the acceptance of novel food products. They should therefore address these emotions in their risk analyses, and either not allow the product on the market (e.g., genetically modified food products are banned from the European market) or “manage” the emotions of the general public.

Deeper values and beliefs are the main drivers of consumer emotions

In order to manage the emotions of consumers it is important to know what causes their emotions. In chapters 3 and 4 I have shown that the emotions associated with genetically modified food are influenced not so much by specific product attributes, but rather by values associated with the environment and technology (see also Grunert et al., 2003). Also the perception of control in purchasing a genetically modified food product has an important influence on the negative and positive emotions experienced (chapter 4). Chapter 5 presents a model where food-related lifestyle values influence emotions, mediated by functional food product evaluations. In this chapter I show that the values health and convenience are crucial in the elicitation of emotions with respect to functional food. Thus, it can be concluded that consumer emotions are a result of what consumers deeply believe in and stand for, rather than being an impulsive reaction. This also explains why emotions have such an important influence on the behavior of consumers.

Moreover, consumers differ in their experiences of emotions. In chapter 4, I showed that the difference in the perception of knowledge has an important influence on how consumers construct their responses with respect to genetically modified food. In chapter 5, I demonstrated that even though the effects of the experienced emotions are the same for consumers of different ages, the intensity and construction of these emotions are not.

In addition, the connection of consumer emotions to socio-demographics is relatively weak. Moderately strong effects were found for gender and age. Men experience more positive affect than women, but only when they think they do not know very much about genetically modified food. For age, I found conflicting results because older consumers experience less fear (chapter 3), but more negative emotions (chapter 4) with respect to genetically modified food. In chapter 5, the results showed that consumers of different ages experience different intensities for negative and positive affect with respect to functional food products. In sum, the segmentation of

consumers should thus be on their similarity in underlying values and beliefs related to the novel food product rather than on their socio-demographic characteristics.

For managers, this means that they have to investigate the deeper values and beliefs that cause consumers to feel certain emotions toward the novel food product. With respect to novel food products relevant values are related to technology, nature and health. Managers should try to link the *production process* of the novel food product to these values in a positive way. For example, in the case of genetically modified food, consumers could learn that the use of gene technology can reduce the utilization of pesticides and other chemicals in the production of foods and that this is good for the environment. Managers thereby appeal to consumers' values related to the environment. Sometimes consumers can seem irrational, but this is often due to their lack of understanding and ability to categorize the novel product (Veryzer, 1998). Managers of both companies and industry-wide organizations need to work together to increase the faith and understanding in science and technology. Managers should inform consumers about the novel food production process and create a transparent and traceable market. This means that consumers need to be able to see what is happening in the market and how products are produced (transparency) and where the novel food products and their ingredients come from (traceability). This will decrease the negative emotions associated with novel food products. Furthermore, managers should keep in mind that especially for polarizing technologies like genetically modified food there are huge differences in the emotions of consumers. It is therefore crucial to segment the consumers based on their values and beliefs.

For public policy makers, relevant values are related to trust in technology and the market system. Public policy makers should first of all aid in the technical education of the general public. When the general public itself can distinguish among the novel food production ways, they will no longer blindly reject all the new food production ways that seem scary. Instead, they will be able to make informed decisions. This will have a positive influence on their trust in science and technology, because science would no longer seem to be out of control and out of reach. Second, for the general public to make informed decisions, it is necessary that public policy makers make the market of novel food products as clear and transparent as possible.

For example, they can set up a comprehensible labeling system and provide easily accessible information. This will decrease the negative emotions and increase the positive emotions of the general public with respect to novel food products.

Manage consumer emotions and use them to your advantage

For both managers and public policy makers alike, the emotions of consumers should be investigated to understand what drives consumers in their rejection or acceptance of a novel food product. Next I discuss two relevant applications. The first addresses how managers can prepare the launch of a novel food product, and the second addresses how public policy makers can provide information to the general public.

Preparing the launch of a novel food product. Many food companies are afraid that whoever markets novel food products, such as genetically modified products, will see their sales decrease and receive negative publicity. I will discuss that negative and positive emotions should be included in the marketing of a novel food product.

Novel food products are likely to elicit negative emotions due to the risk and uncertainty they bring with them (chapters 3, 4 and 5). Consumers are worried about the negative consequences of the novel food product. For example, they are concerned about their health and the environment when gene technology is applied on a large scale. In addition, consumers often have difficulty comprehending the production process of new biotechnologies (chapter 4). If a consumer does not understand a new product, which deviates strongly from known categories, the product will be evaluated less favorably (Peracchio and Tybout, 1996). Also, the evaluation of a novel food product will be more based on its affective aspects (chapter 4). Consumers sometimes feel that radical novel food products like, for example, gene technology applied in food production have crossed the "just right" level for innovations and are unacceptable (Goldenberg et al., 2001). It is therefore important that managers focus on the reduction of negative emotions created by the negative consequences and lack of knowledge about the production process.

Often the producing firm fails to consider the consumer's viewpoint and only focuses on the technological side of radical new products (Veryzer, 1998). This is also the problem with many biotechnological applications. Again, gene technology in food

production is a good example. A few experts think that genetic modification of food products is a solution to reduce hunger in the Third World, but the general public thinks that scientists are tampering with nature and consequently they are scared (chapter 3). Because novel products already reflect a high level of uncertainty and risk, it is therefore crucial that the beneficial consequences should be clear to the consumer, because if they are not, the consumer will avoid the radical innovation. More than 30 years ago Myers and Marquis (1969) already stated that new products are more successful if they are designed to satisfy a perceived need rather than if they are developed to take advantage of a new technology (see also Wind and Mahajan, 1997). Genetically modified food and functional food products both have a high degree of technical manipulation, but whereas for now genetically modified food products only have producer advantages, functional food products have clear consumer health advantages. This could be an explanation for the differences in acceptance. It is therefore crucial that managers focus on the increase of positive emotions by making clear what the benefit of the novel food product is for consumers.

Managers should thus simultaneously focus on the reduction of negative emotions and increase in positive emotions when preparing the launch of a novel food product, for both are crucial aspects of the acceptance of novel food products. They can do this with the use of consumer means-end chains (MECs). MECs are frequently used in food choice analyses (Grunert, 2005). This methodology links product attributes to values via the benefits yielded by those attributes. Managers can employ the results from this dissertation where benefits and values have been related to novel food technologies.

Providing information about a novel food product to the general public.

What should be communicated? Chapter 3 reveals that consumers who experience more fear toward genetically modified food are more interested in information about food production. Yet previous research has shown that simply providing positive information about a novel food product is not always sufficient, for providing information may evoke rather than reduce negative emotions (Grunert et al., 2001; Scholderer and Frewer, 2003). Consumers cannot easily separate the benefits and the risks of a novel food product (Alhakami and Slovic, 1994). This means that when consumers associate a high risk with a novel food product they will relate fewer benefits to it. Informing the consumer about the benefits should therefore not be the

only message. Rather public policy makers should make sure that novel food products are carefully labeled and that the general public is informed about how technologies are used, why they are used and how consumers can recognize them.

Who should communicate information regarding novel food products? This question regards the belief of consumers that this particular party will provide them with correct information about the novel food product. In this dissertation I did not specifically focus on the communication channels for novel food products, but some aspects were included in chapter 4. The results showed that especially the packaging is an important source of information. This would imply that consumers trust both companies and public policy makers enough to rely on the label on a package. Yet packages are only considered when a consumer picks up a product. More importance should therefore be attached to the reliance on the media, which is the second most important source of information for consumers. The media have played a central role in the creation of negative emotions with respect to genetically modified food products in Europe (see chapter 3 for an overview of newspaper headings). What they are communicating is not necessarily correct, but for consumers it is so much easier to rely on media than the experts, because the experts in general are more difficult to understand and reach for the layperson. Furthermore, the popular press usually voices what the consumers want to hear. Public policy makers should therefore take into account the messages in the media and their influence. In addition, I propose that public policy makers should learn from the media on how to reach consumers. They should cooperate with the media in the management of consumers' emotions.

Who should be the target group? Chapter 3 has shown that consumers who are fearful toward genetically modified food products are open for information about the production process of food. Chapter 4 showed that consumers high on perceived knowledge are more open for information, whereas those with a lower perception of knowledge are rather passive and disinterested in information regarding novel food products. Consumers with a low perception of knowledge also believe more strongly that the government and experts will take care of public health than consumers with a high perception of knowledge. This low-knowledge group consists of mostly women of lower social class. Not only are they difficult to reach, they are also the ones that go grocery shopping more often (and thus decide about the acceptance of novel food products) than men from higher classes (which constitute a larger part of the consumers with a high perception of knowledge).

Public policy makers should thus focus on providing understandable and interest-creating information about novel food products that has the potential to reach all layers of the population. In essence, they have to educate the public about food technologies and the market system. The purpose is to increase the trust in science and perception of control, which will reduce the negative emotions and increase the positive emotions of the general public. To do this they should cooperate with the media in the supply of information to the general public.

In sum, this dissertation has investigated consumer emotions and their role in the responses of consumers to novel food products. It has produced important insights, and I hope that this dissertation will be an inspiration for others to conduct research in the area of novel food products and consumer emotions, because there will always be novel food technologies that are opposed and rejected by the public.

MEASUREMENT APPENDICES

Appendix A: Scale Operationalization Chapter 3¹

Concern for nature

This measure is an aggregated index consisting of the following statements:

- a. When I think of food safety I think about organic products. (1 = yes, 12%; 0 = no, 88%)
- b. I would change my own behavior to improve animal well-being. (1 = yes, 42%; 0 = no, 58%)
- c. I think that the well-being of animals should be much further improved. (1 = yes, 17%; 0 = no, 83%)
- d. I agree that stricter rules for animal transportation are necessary. (1 = yes, 12%; 0 = no, 88%)
- e. I agree that stricter rules for animal rearing are necessary. (1 = yes, 18%; 0 = no, 82%)
- f. I do not think that the tails of pigs should be removed, because it is their lifestyle that has to be changed. (1 = yes, 68%; 0 = no, 32%)
- g. I agree that food production should come from the own region. (1 = yes, 18%; 0 = no, 82%)
- h. I agree that food should be produced in an environmental manner and if necessary only for the own population. (1 = yes, 23%; 0 = no, 77%)

Faith in technology in food production

What do you think of the growing influence of technology on food production?

1. I do not trust the use of new technologies. (23%)
2. I have somewhat trust in new technologies. (57%)
3. I have a lot of trust in new technologies. (20%)

Attitude toward genetically modified food

What do you think of genetic modification of food?

1. Something that should be forbidden due to the risks. (37%)
2. Disturbingly, but we can probably not do without it. (27%)
3. Not important for me, because I have no influence on it. (12%)
4. A new chance to cut back the use of pesticides. (10%)
5. A new chance to solve the world food problem. (12%)
6. Progress for everybody. (2%)

¹ The percentage of respondents indicating the response category in question is given in parentheses.

Attitude toward genetic modification of animals

What do you think of the possibilities to change animals in food production by genetic modification?

1. It is not allowed. (43%)
2. It is only allowed if there is no unnecessary suffering of animals and no risk for human beings. (35%)
3. It is allowed to change animals genetically in such a way that their lives get better. (6%)
4. It is allowed, but only for the production of drugs. (10%)
5. It is allowed for the production of healthier food or drugs. (6%)

Interest in information related to genetic modification

How important are, among others, the following aspects to get information on for you?

1. The way a food product is produced
2. Ingredients of a food product
3. Genetic modification
 - a. None of them is in my top 3 of important aspects (36%)
 - b. One of these aspects is on place 3 (18%)
 - c. One of these aspects is on place 2 (21%)
 - d. One of these aspects is on place 1 or two are on place 2 and 3 (18%)
 - e. Two aspects are on place 1 and 3 (4%)
 - f. Two of these aspects are on place 1 and 2 (2%)
 - g. All of these aspects are in my top three (1%)

Appendix B: Scale Operationalization Chapter 4²

Perceived knowledge

1. I feel very knowledgeable about genetic modification of food.
2. If a friend asked me about a genetically modified food product, I could give him/her advice.
3. If I had to purchase a genetically modified food product today, I would need to gather very little information in order to make a decision.

Net cognition

1. Genetically modified food products will improve the standard of living of future generations.
2. Applying gene technology in food production will increase economic growth and welfare.
3. Applying gene technology in food production will reduce famine in Third World countries.
4. Applying gene technology in food production will reduce the use of pesticides in agriculture.
5. Genetically modified food products are healthier than other food products.
6. Applying gene technology in food production will increase the assortment choice in supermarkets.
7. Genetically modified food products taste better.
8. Genetically modified food products have a longer shelf life.
9. Genetically modified food products have a nicer appearance.
10. Genetically modified food products have a better quality than other food products.
11. Applying gene technology in food production will unbalance ecological systems.*
12. Applying gene technology in food production is unnatural.*
13. Nobody knows the long-term consequences on the environment of applying gene technology in food production.*
14. Genetically modified food products are a threat to human health.*
15. Genetically modified food products cause allergies among humans.*

² All items are measured on a five-point Likert scale ranging from “I completely disagree” (=1) to “I completely agree” (=7). Purchase intention is measured on a five-point Likert scale ranging from “most certainly not” (=1) to “most certainly” (=5). The emotion items are measured on a five-point Likert scale ranging from “I feel this emotion not at all” (=1) to “I feel this emotion very strongly” (=5). Recoded items are indicated with an asterisk.

Negative affect

1. Scared
2. Afraid
3. Panicky
4. Nervous
5. Worried
6. Tensed
7. Angry
8. Irritated
9. Discontented
10. Depressed
11. Sad
12. Miserable

Positive affect

1. Contented
2. Fulfilled
3. Peaceful
4. Encouraged
5. Enthusiastic
6. Happy
7. Pleased
8. Joyful

Promotion orientation

1. I frequently imagine how I will achieve my hopes and aspirations.
2. I see myself as someone who is primarily striving to reach my “ideal self”.
3. In general, I am focused on achieving positive outcomes in my life.
4. Overall, I am more oriented toward achieving success than preventing failure.
5. I typically focus on the success I hope to achieve in the future.

Trust in science and technology

1. People would be better off if they lived a more simple life without so much technology.*
2. Future scientific research is more likely to cause problems than to find solutions to the problems.*
3. Technology will find a way of solving the problems of shortages in natural resources.
4. Technological changes will create a better future.

Perception of control

1. I feel I have total control in choosing a genetically modified food product.
2. I feel I have total control in avoiding a genetically modified food product.*
3. I feel I have total control in choosing a food product with genetically modified ingredients.
4. I feel I have total control in avoiding a food product with genetically modified ingredients.*

Attitude

1. Genetic modification of food is extremely bad – extremely good.
2. Genetic modification of food is unappealing – appealing.
3. Genetic modification of food is negative – positive.

Purchase intention

1. To what extent do you intend to buy a genetically modified food product?

Delay

1. I delay the purchase of genetically modified food products until additional information is available.
2. When genetically modified food products are introduced at the market, I first wait and see.
3. I wait with purchasing genetically modified food products.

Negative WOM

1. I will talk with friends and acquaintances about genetically modified food products.
2. I will talk with my partner and/or relatives about genetically modified food products.
3. I will discourage others who seek my advice to consume genetically modified food products.

Complaining

1. I will complain to external agencies, such as the consumer union, when genetically modified food products are introduced at the Dutch market.
2. I will file a written complaint to the company producing genetically modified food products.
3. I will write a written complaint to the supermarket chain selling genetically modified food products.

Appendix C: Scale Operationalization Chapter 5³

Purchase intention

1. To what extent do you intend to buy functional food product A?

Negative affect

$\alpha_{\text{All}} = .92$, $\alpha_{25-34} = .90$, $\alpha_{35-44} = .93$, $\alpha_{45-56} = .91$, $\alpha_{57-70} = .90$

1. Angry
2. Irritated
3. Discontented
4. Scared
5. Afraid
6. Nervous
7. Worried
8. Tense
9. Depressed
10. Sad
11. Miserable
12. Helpless

Positive affect

$\alpha_{\text{All}} = .94$, $\alpha_{25-34} = .95$, $\alpha_{35-44} = .95$, $\alpha_{45-56} = .92$, $\alpha_{57-70} = .93$

1. Content
2. Fulfilled
3. Peaceful
4. Enthusiastic
5. Joyful
6. Happy
7. Pleased
8. Hopeful

³ All items are measured on a seven-point Likert scale ranging from “I completely disagree” (=1) to “I completely agree” (=7), with the exception of purchase intention and negative and positive affect. Purchase intention is measured on a five-point Likert scale ranging from “most certainly not” (=1) to “most certainly” (=5). The emotion items are measured on a five-point Likert scale ranging from “I feel this emotion not at all” (=1) to “I feel this emotion very strongly” (=5). Note that for purchase intention, the emotions and product evaluations consumers were asked for a specific functional food A with addition X (e.g., fruit juice with added vitamins). Recoded items are indicated with an asterisk.

Relative advantage

$\alpha_{All} = .75$, $\alpha_{25-34} = .74$, $\alpha_{35-44} = .73$, $\alpha_{45-56} = .75$, $\alpha_{57-70} = .75$

1. For me personally it is not necessary that functional food A with addition X is for sale.*
2. I consider myself belonging to the target group of functional food A with addition X.
3. It is valuable for other consumers that functional food A with addition X is on the market, but not for me personally.*

Taste

1. Functional food A with addition X tastes at least as good as food A without addition X.

Confidence in the benefit

$\alpha_{All} = .89$, $\alpha_{25-34} = .89$, $\alpha_{35-44} = .88$, $\alpha_{45-56} = .90$, $\alpha_{57-70} = .89$

1. I do not believe in the positive effect of adding X to functional food A.*
2. Functional food A with addition X improves my health.
3. I am certain that functional food A with addition X is effective in improving my health.
4. The positive consequences of using functional food A with addition X can be clearly visualized and will happen in the near future.
5. Functional food A with addition X is consistent with what I want.
6. Functional food A with addition X will improve my situation.
7. Functional food A with addition X will help me attain what I want.

Perceived ability to purchase

$\alpha_{All} = .50$, $\alpha_{25-34} = .60$, $\alpha_{35-44} = .41$, $\alpha_{45-56} = .45$, $\alpha_{57-70} = .50$

1. Nothing would stop me (e.g. price) when I would want to buy functional food A with addition X.
2. Despite the higher price I am able to buy functional food A with addition X, if I would want to.

Novelty of addition

1. The addition of X to functional food A is novel.

Price

$\alpha_{All} = .85$, $\alpha_{25-34} = .79$, $\alpha_{35-44} = .84$, $\alpha_{45-56} = .89$, $\alpha_{57-70} = .83$

1. I compare prices between product variants in order to get the best value for money.
2. I always check prices, even on small items.
3. I always try to get the best quality for the best price.
4. I notice it when products I buy regularly change in price.
5. It is important for me to know that I get quality for my money.
6. I watch for ads in flyers for store specials and plan to take advantage of them when I go shopping.

Novelty proneness

$\alpha_{All} = .90$, $\alpha_{25-34} = .89$, $\alpha_{35-44} = .90$, $\alpha_{45-56} = .91$, $\alpha_{57-70} = .89$

1. I love to try recipes from foreign countries.
2. I only buy and eat foods that are familiar to me.*
3. I like to try new foods that I have never tasted before.
4. I look for ways to prepare unusual meals.
5. I like to try out new recipes.
6. Recipes and articles on food from other culinary traditions make me experiment in the kitchen.

Convenience

$\alpha_{All} = .56$, $\alpha_{25-34} = .45$, $\alpha_{35-44} = .48$, $\alpha_{45-56} = .54$, $\alpha_{57-70} = .58$

1. I use a lot of pre-cut vegetables and meat with cooking.
2. We use a lot of ready-to-eat foods in our household.
3. I use a lot of mixes, for instance powder soups and pasta sauce from a jar.

Health

$\alpha_{All} = .83$, $\alpha_{25-34} = .79$, $\alpha_{35-44} = .80$, $\alpha_{45-56} = .83$, $\alpha_{57-70} = .81$

1. I prefer fresh products to canned or frozen products.
2. I prefer to buy natural products, i.e. products without preservatives.
3. It is important to me that food products are fresh.
4. I try to avoid food products with additives.
5. I prefer to buy meat and vegetables fresh rather than pre-packed.
6. To me the naturalness of the food that I buy is an important quality.

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SUMMARY IN DUTCH

(Nederlandse Samenvatting)

Consumenten worden veelvuldig geconfronteerd met voedingsproducten die worden geproduceerd door middel van nieuwe technologieën. De reactie van het publiek is echter niet wat de biotechnologie- en voedingsproducenten hadden verwacht of gehoopt. De meerderheid van de consumenten wijst bijvoorbeeld genetisch gemodificeerde voedingsproducten af. Consumenten zijn meer en meer geïnteresseerd in hun gezondheid en willen weten hoe hun voeding wordt gemaakt en waar het vandaan komt. In hun evaluatie van voedingsproducten nemen zij dan ook deze factoren mee. Technologisch nieuwe voedingsproducten veroorzaken emoties voor verschillende redenen. Emoties zijn de reacties op gebeurtenissen die belangrijk zijn voor een individu. De interesse in of zelfs bezorgdheid over de productie van voedingsproducten zal daarom emoties met betrekking tot een bepaald voedingsproduct oproepen. Ten tweede veroorzaakt technische vernieuwing zelf al emoties, want consumenten staan namelijk alleen achter nieuwe producten wanneer de manier waarop ze geproduceerd worden niet drastisch veranderd is. Ten derde worden deze emoties nog eens versterkt door het feit dat voedingsproducten als enige consumptiegoed dienen te worden ingeslikt en dus een direct effect hebben op de gezondheid. Alle voedingsproducten op de schappen in de supermarkt zouden veilig moeten zijn, maar wanneer een consument een voedingsproduct als onveilig ervaart, zal hij negatieve emoties ervaren, onafhankelijk van het feit of het product nu echt onveilig is of niet. Als een gevolg van de negatieve emoties zal hij het product laten staan. De emoties van consumenten hebben dus een belangrijke invloed op het gedrag van consumenten.

Het **centrale doel van dit proefschrift** is daarom duidelijkheid te scheppen rondom de emoties van consumenten met betrekking tot nieuwe voedingsproducten waarvoor een nieuwe en geavanceerde technologie gebruikt wordt. Daarmee wordt in dit proefschrift een link gelegd tussen een prominent onderwerp in de consumenten literatuur, namelijk *consumenten emoties*, en een prominent onderwerp in onze hedendaagse maatschappij, namelijk *technologisch nieuwe voedingsproducten*.

Het groeiende aantal consumenten onderzoeken die zich richten op consumenten en hun emoties laat zien dat het een erg breed gebied is met meer verschillen dan overeenkomsten. Desondanks laten alle studies zien hoe belangrijk de rol van emoties is voor consumentengedrag. In onze complexe wereld, waar consumenten bedolven worden onder informatie, is het voor consumenten een stuk gemakkelijker om te vertrouwen op hun gevoelens dan om een zorgvuldig afgewogen evaluatie te maken. Dit proefschrift heeft bijgedragen aan deze literatuur op verschillende manieren. Ten eerste creëer ik een model voor emoties van consumenten wat onderscheid maakt tussen emoties op verschillende niveaus van abstractie (hoofdstuk 2). Ik bespreek de verschillen in intensiteit van emoties tussen nieuwe voedingsproducten (hoofdstuk 2), en dat vooral angst aan genetisch gemodificeerde voedingsproducten kan worden gekoppeld (hoofdstuk 3). Ten tweede richt ik me op de interactie tussen de emoties en cognitieve opvattingen van een consument. Emoties worden naast risico's en voordelen geplaatst in hun invloed op de aankoopintentie (hoofdstuk 4). Op deze manier komt hun relatieve belang duidelijk naar voren. Bovendien breid ik het waarde-evaluatie-gedrag model uit door de emoties van consumenten tussen evaluaties en gedrag toe te voegen (hoofdstuk 5).

Daarnaast kan dit proefschrift worden gezien als een poging om de gevoelens van de maatschappij ten opzichte van nieuwe technologieën in de voedingsproductie beter te begrijpen. Het blijkt moeilijk te zijn om consumenten te overtuigen van het nut van deze producten. Het is daarom belangrijk voor managers en beleidsmakers om te weten hoe de emoties van consumenten ontstaan, wat voor gevolgen ze hebben, en hoe ze om kunnen gaan met deze emoties.

In **hoofdstuk 2** geef ik een overzicht van de literatuur over consumentengedrag waarin emoties de hoofdrol spelen. Daarna combineer ik verschillende emotie-onderzoeksrichtingen om een hiërarchisch consumenten emoties model te construeren met drie niveaus van abstractie. Negatieve en positieve affect vormen het hoogste niveau van abstractie. Deze dimensies komen ook het meest voor in de literatuur over emoties. Vier negatieve en vier positieve basisemoties beslaan het middelste niveau. Dit zijn boosheid, angst, bedroefdheid, beschaamdheid, tevredenheid, geluk, liefde en trots. Het laagste niveau bestaat uit specifieke consumenten emoties. Dit model test ik op verschillende types nieuwe voedingsproducten onder 645 Nederlandse

consumenten. Dit zijn genetisch gemodificeerde voeding, functionele voeding, biologische voeding, en voedingsproducten uit de supermarkt (basisgroep). De resultaten duiden erop dat de basisemoties beter de gevoelens van consumenten weergeven met betrekking tot nieuwe voedingsproducten dan negatieve en positieve affect alleen.

Hoofdstuk 3 richt zich op de relatie tussen genetisch gemodificeerde voeding en angst. Een onderzoek in internationale media laat zien dat er veelvuldig angstgerelateerde stukken gepubliceerd worden met betrekking tot genetisch gemodificeerde voeding. Om de relatie tussen genetisch gemodificeerde voeding en angst te onderzoeken valideer ik een schaal om de angst van consumenten met betrekking tot genetisch gemodificeerde voeding te meten. De resultaten laten zien dat Nederlandse consumenten ($n = 645$) zich inderdaad angstiger voelen wanneer ze aan genetisch gemodificeerde voeding denken dan aan andere nieuwe voedingsproducten, zoals bijvoorbeeld functionele voedingsproducten. Ik heb geen sterke relaties gevonden tussen socio-demografische kenmerken van consumenten en hun angst met betrekking tot genetisch gemodificeerde voeding. Dit betekent dat angst met betrekking tot dit technologisch nieuwe voedingsproduct een emotie is die in alle lagen van de maatschappij voorkomt. Verder heb ik een conceptueel model ontwikkeld en getest met de belangrijkste antecedenten en gevolgen van angst met betrekking tot genetisch gemodificeerde voeding. Angst met betrekking tot genetisch gemodificeerde voeding wordt positief beïnvloed door de bezorgdheid van consumenten over het milieu en negatief door hun vertrouwen in technologie. Consumenten die meer angst hebben met betrekking tot genetisch gemodificeerde voeding hebben een negatievere houding ten opzichte van genetisch gemodificeerde voeding in het algemeen en genetisch modificatie van dieren, en hebben een grotere interesse in informatie gerelateerd aan voedingsproductie en genetische modificatie.

In **hoofdstuk 4** onderzoek ik de invloed van emoties en opvattingen van consumenten op hun reactie op genetisch gemodificeerde voeding. Deze reacties zijn de houding van de consument, hun aankoopintentie, beslissing om te wachten, negatieve mond-tot-mond “reclame”, en de intentie om te gaan klagen. Na het schatten van het algemene model heb ik de respondenten verdeeld in twee groepen: een groep met respondenten die denken dat ze weinig weten over genetisch

gemodificeerde voeding, en een groep met respondenten die denken dat ze veel kennis hebben over genetisch gemodificeerde voeding. Ik verwachtte dat het meer weten over het nieuwe voedingsproduct een cruciale invloed zou hebben op hoe consumenten deze producten evalueren. Mijn onderzoek laat inderdaad zien dat consumenten met weinig gepercipieerde kennis over genetisch gemodificeerde voeding minder vertrouwen op hun cognitieve opvattingen dan consumenten met meer gepercipieerde kennis over genetisch gemodificeerde voeding. Negatieve en positieve emoties spelen een belangrijke rol in de reacties van consumenten voor beide groepen. Ik vind bovendien in mijn onderzoek dat het niveau van gepercipieerde kennis geen invloed heeft op de intensiteit van het gevoel van controle of vertrouwen in wetenschap en technologie. Maar voor consumenten die denken dat ze weinig kennis bezitten, hebben deze aspecten minder invloed op hun opvattingen dan voor consumenten met meer kennis over genetisch gemodificeerde voeding.

Hoofdstuk 5 onderzoekt de antecedenten van de emoties en aankoopintentie voor functionele voedingsproducten. Om te onderzoeken hoe consumenten tot hun aankoopbeslissing komen, bevat het conceptuele raamwerk: voedingsgerelateerde waarden, evaluaties betreffende functionele voedingsproducten, en emoties. Ik verdeel consumenten in vier groepen variërend van jong (25 tot 34 jaar oud) tot oud (57 tot 70 jaar oud), met twee groepen daartussen (35 tot 44 jaar oud en 45 tot 56 jaar oud). Alhoewel er verschillen zijn in de intensiteit van emoties tussen de verschillende groepen, zijn er geen verschillen in de invloed die positieve en negatieve emoties hebben op de aankoopintentie. Mijn onderzoek laat zien dat de waarden *gezondheid* en *gemak* belangrijk zijn voor de evaluatie van een functioneel voedingsproduct. Van de evaluaties zijn vooral *relatief belang* en *vertrouwen in het voordeel* van belang. Opmerkelijke resultaten waren de volgende. Wanneer consumenten tussen 25 en 34 jaar oud overtuigd zijn van het relatieve belang van het functionele voedingsproduct dan hebben zij een hogere aankoopintentie dan consumenten in de andere leeftijdsgroepen. Smaak heeft alleen een belangrijke invloed op de aankoopintentie voor consumenten tussen 35 en 44 jaar oud. Relatief belang heeft de kleinste invloed op de aankoopintentie voor de leeftijdsgroep tussen 45 en 56 jaar. Als een gevolg daarvan wegen hun sterke negatieve emoties zwaarder dan voor de andere leeftijdsgroepen. Voor de oudste leeftijdsgroep laten de resultaten zien dat wanneer zij hun gezondheid belangrijk vinden, zij relatief minder belang hechten aan het

functionele voedingsproduct. Dit duidt erop dat de relatie tussen functionele voedingsproducten en gezondheid negatief is voor deze consumenten, ondanks dat het het doel is van functionele voedingsproducten om positief te zijn voor de gezondheid.

Gebaseerd op mijn proefschrift identificeer ik enkele belangrijke **onderzoeksgebieden in consumentengedrag**. Het eerste onderzoeksgebied beslaat de dimensies van emoties van consumenten. Ik laat in mijn proefschrift zien dat emoties van consumenten ook gedefinieerd kunnen worden op basis van hun niveau van abstractie. Toekomstig onderzoek zou zich kunnen richten op de oorzaken en gevolgen van het niveau van abstractie van emoties door consumenten ervaren.

Het tweede onderzoeksgebied betreft het meten van emoties van consumenten. Ik adviseer dat toekomstig onderzoek een zo klein mogelijk aantal emoties per valentie gebruikt, en emoties gebruikt die zo relevant en duidelijk mogelijk zijn voor de betreffende onderzoekssituatie. Toekomstig onderzoek zou zich kunnen buigen over een verbetering van het meten van emoties van consumenten in vragenlijst toepassingen.

Het derde onderzoeksgebied betreft het gebruik van emoties van consumenten in onderzoek. Uit mijn proefschrift is gebleken dat emoties een belangrijke invloed hebben op gedrag, bovenop de invloed van risico's en voordelen van een bepaald product. Toekomstig onderzoek zou zich kunnen richten op de verschillen tussen consumenten, aangezien verschillende consumenten geconfronteerd met hetzelfde product, verschillende emoties en reacties op deze emoties kunnen hebben.

Het vierde onderzoeksgebied gaat over de combinatie van emoties van consumenten met nieuwe voedingsproducten. Emoties van consumenten zijn belangrijk voor de analyse van nieuwe voedingsproducten, maar voor verschillende nieuwe voedingsproducten dienen wel verschillende raamwerken te worden gecreëerd. Toekomstig onderzoek zou zich kunnen concentreren op andere nieuwe voedingsproducten, effectiviteit van verpakkingen, de relatie tussen prijs en emoties, en het effect van de introductie van nieuwe voedingsproducten op andere voedingsproducten.

De resultaten van mijn proefschrift hebben belangrijke gevolgen voor **managers en beleidsmakers**. Enkele belangrijke punten zijn de volgende. Ten eerste zijn emoties van consumenten essentieel om reacties op nieuwe voedingsproducten te

begrijpen. Dit betekent dat managers de emoties van hun klanten in het oog dienen te houden en deze moeten proberen te begrijpen zodat zij er adequaat op kunnen reageren. Voor beleidsmakers komt dit neer op het niet alleen meenemen van een objectieve risico-analyse door experts, maar ook het leren van de emoties van het publiek wanneer een technologisch nieuw product wordt geïntroduceerd in the maatschappij.

Ten tweede zijn het diepere waarden en opvattingen die emoties van consumenten beïnvloeden. Dit betekent dat emoties van consumenten het resultaat zijn van waarin consumenten diep geloven en niet een impulsieve reactie, zoals vaak wordt gedacht. Dit verklaart ook de grote invloed van emoties op consumentengedrag. Managers moeten daarom proberen het productieproces van nieuwe voedingsproducten aan positieve waarden te koppelen om zo positieve emoties te creëren. Beleidsmakers zouden het publiek moeten proberen meer achtergronden over technologieën te verschaffen, zodat consumenten zelf kunnen beslissen wat ze acceptabel vinden en wat niet, in plaats van alle technologieën als eng af te schilderen. Verder moet de nieuwe voedingsproducten markt zo transparant en duidelijk mogelijk zijn, want dit vermindert de negatieve emoties van het publiek.

Ten derde is het zaak om emoties van consumenten te gebruiken om zo consumenten beter te begrijpen. Wanneer een nieuw voedingsproduct op de markt wordt geïntroduceerd, is het belangrijk dat managers proberen negatieve emoties, veroorzaakt door gepercipieerde risico's en gebrek aan kennis, te verminderen. Ook dienen zij positieve emoties te stimuleren door duidelijk te maken wat het voordeel is van het nieuwe voedingsproduct voor consumenten. Beleidsmakers dienen te concentreren op het verschaffen van duidelijke en interessante informatie over nieuwe voedingsproducten die alle lagen van de bevolking bereikt. Zij zouden de maatschappij moeten leren over voedingstechnologieën zodat het vertrouwen in de wetenschap en technologie verbeterd wordt, waardoor negatieve emoties zwakker en positieve emoties sterker worden.

Tot slot, dit proefschrift heeft emoties van consumenten en hun rol in de reacties van consumenten ten opzichte van nieuwe voedingproducten onderzocht. Belangrijke inzichten zijn naar voren gekomen, en ik hoop dat dit proefschrift als inspiratiebron dient voor anderen om onderzoek te verrichten op het gebied van

nieuwe voedingsproducten en emoties van consumenten, omdat er altijd nieuwe voedingstechnologieën zullen zijn die worden afgewezen door de maatschappij.

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